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### THE HISTORY OF RECORDING THE BLOOD PRESSURE.

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THE medical practitioner of the present generation is prone to regard the estimation of blood pressure as a matter of routine, all oblivious of the debt owed to those on whose well laid foundations knowledge has been built, often forgetful even of the names of our illustrious predecessors in the art of clinical medicine. It is therefore not inappropriate that we should pause for a moment and look back briefly at the work of the great men of the past, whose painstaking labours in experimental

physiology have placed blood pressure estimation on a practical basis for us in the clinical investigation of patients, particularly those suffering from vascular disease.

It is surely no reproach to our craft that the story of the investigation of the pressure of the blood stream dates back to the work of a man of amazing insight and clear perception of the experimental method, who belonged not to our profession, but to the Church. It is to the Reverend Stephen Hales (1677-1761), rector of Farringdon, Hampshire, and curate of Teddington, Middlesex, that credit is given for the first published observations of the pressure of blood in the arteries. In Hales's "Statical Essays", published in 1733, reference is made to his observations on blood pressure, which, as he states, were made "about 25 years since", that is, in 1708.

It is curious to note that although Harvey had definitely established the fact of the circulation of the blood through the blood vessels a hundred years



FIGURE I.  
Reverend Stephen Hales.

previously, no satisfactory attempt to measure the force of the circulation had been recorded in the

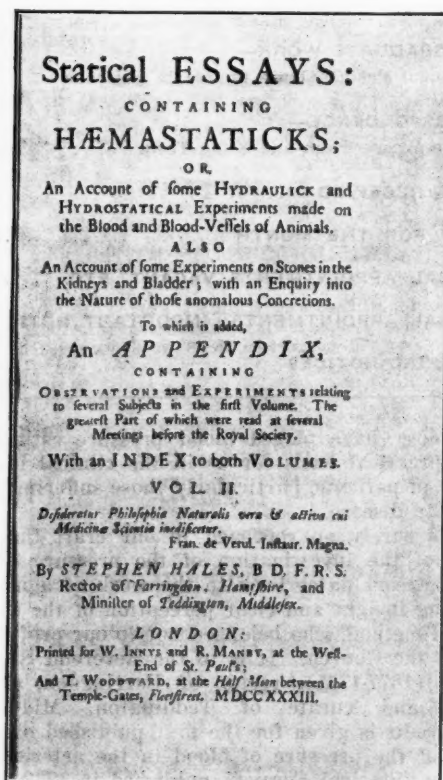


FIGURE II.  
Title page of Volume II of Reverend Stephen Hales's book.

intervening period. Hales first observed the force of rising sap in plants, which he measured by the "mercurial gage". His experiments in blood pressure were performed first with the crural arteries of dogs; about six years afterwards he described his experiments "on two horses and a fallow doe". "In December I caused a mare to be tied down alive on her back; she was fourteen hands high, and about fourteen years of age, had a fistula on her withers, was neither very lean nor yet lusty. Having laid open the left crural artery about three inches from her belly, I inserted into it a brass pipe whose bore was one-sixth of an inch in diameter; and to that, by means of another brass pipe which was fitly

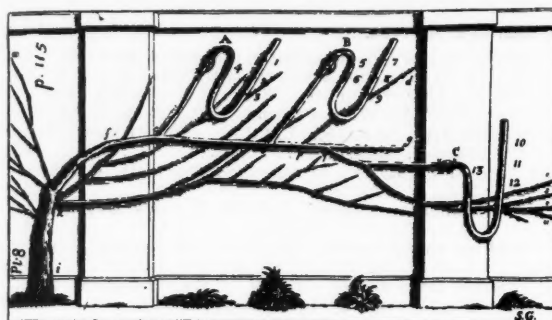


FIGURE III.  
Hales's "mercurial gage", which measured the force exerted by rising sap.

adapted to it, I fixed a glass tube of nearly the same diameter, which was nine feet in length. Then untying the ligature on the artery, the blood rose in the tube eight feet three inches perpendicular above the level of the left ventricle of the heart."

Hales states that after these experiments he "did not then pursue the matter any further, being discouraged by the disagreeableness of anatomical dissections". Possibly he felt it unseemly that his clerical hands should be soiled by the blood of animals, or perhaps even at that remote period parishioners with anti-vivisectionist tendencies may have been numbered among his flock. Later, however, he "was encouraged to resume the inquiry, by variety of such experiments as I conjectured would give some light into the matter". He studied the capacity of the ventricles, the velocity of the blood in the aorta, the resistance of the arterial capillaries, the strength of arterial and venous walls, and other aspects of the circulatory problem. The experiments were an important contribution to the knowledge of the circulation; not only did Hales discover the blood pressure, but pointed out the importance of the peripheral vessels in the maintenance of the circulation. His appreciation of the physiological problems involved appears to have been extraordinarily acute, untrammelled by the vague speculations and ill-founded hypotheses which obscured the minds of so many of his contemporaries.

With becoming modesty he writes: "We must be content in this our infant state of knowledge, while

we know in part only, to imitate children, who for want of better skill and abilities and of more proper materials, amuse themselves with slight buildings. In the meantime it would ill become us in this, our state of uncertainty, to treat the errors and mistakes of others with scorn and contempt, when we ourselves see things *but as through a glass darkly*, and are very far from any pretensions to infallibility."

The next important advance in the study of circulation was made by Poiseuille, a French medical student, who described his "hæmodynamometer" in his graduating dissertation in 1828. He repeated Hales's experiment, substituting a mercury manometer for the long glass tube, connected to the artery by a leaden tube filled with a solution of potassium carbonate to prevent coagulation. He showed that the blood pressure rises and falls on expiration and inspiration, and measured the degree of arterial dilatation produced by each heart beat. Poiseuille's instrument was improved by Carl Ludwig in 1847, who added a float to the mercurial column, and "had the genius to cause this float to write on a recording cylinder, and thus at one coup gave us the kymograph or wave writer, and the application of the graphic method to physiology".

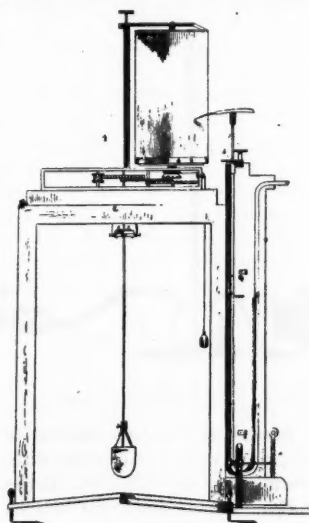


FIGURE IV.  
Ludwig's kymograph.

The first accurate estimation of the blood pressure in man was made in 1856 by Faivre, who, in the course of an operation, connected an artery with a mercurial manometer and made direct readings. The blood pressure in the femoral artery he found to be 120 millimetres of mercury, and the pressure in the brachial artery to vary from 120 to 115 millimetres. These observations were repeated by other investigators, and were of great importance in that they established normal values; but the method was obviously impracticable for clinical application.

The next advance was made by Karl Vierordt, professor of physiology at Tübingen, who introduced the graphic method of registering the pulse, and in 1855 formulated the principle that indirect estimation of the pulse pressure could be performed by means of measuring the counter pressure necessary to obliterate the pulsation in an artery.

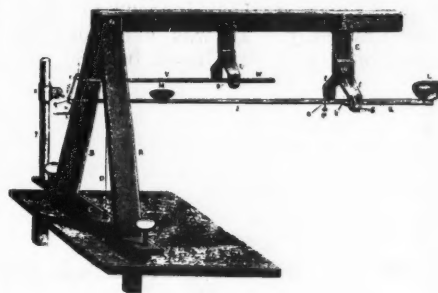


FIGURE V.  
Vierordt's sphygmograph.

He devised the sphygmograph and endeavoured to estimate the pressure necessary to obliterate the radial pulse by a weight attached to a lever. His apparatus appeared rather cumbersome, but was a direct ancestor of the modern sphygmograph.

Next, Marey improved Vierordt's method of registering the pulse, and devised the sphygmomanometer, thereby introducing into clinical medi-

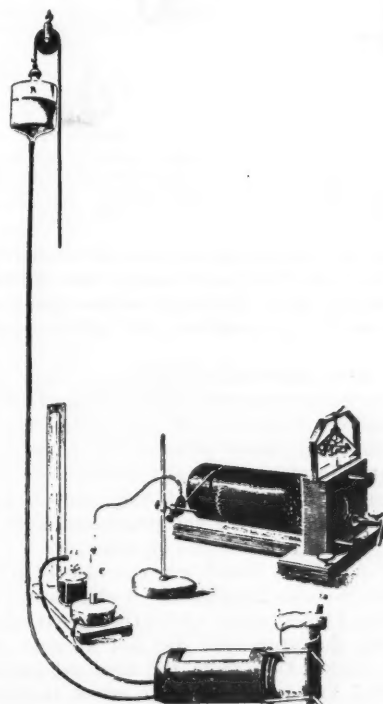


FIGURE VI.  
Marey's sphygmomanometer.

cine a more precise method of registering the blood pressure. His observations were made by noting first the pressure recorded by the manometer at which the greatest excursions of the sphygmographic tracings occurred, and then, by gradually increasing the pressure by raising the levelling bulb, noted the pressure at which the excursions of the indicator ceased. This he regarded as the systolic pressure. The method was rather inaccurate and the apparatus unwieldy. It was succeeded by the sphygmomanometer of von Basch in 1880. In this



FIGURE VII.

von Basch's sphygmomanometer. *a* = manometer tube, *d* = bulb containing mercury, *e* = bulb containing water, with which the radial pulse was compressed.

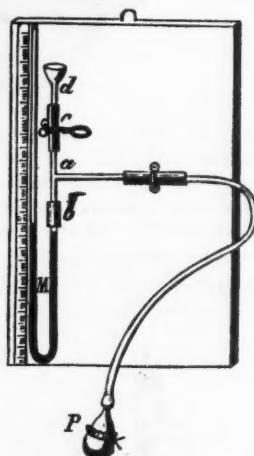


FIGURE VIII.

Zadek's sphygmomanometer. *M* = manometer, *P* = bulb that was applied to the wrist with sufficient pressure to obliterate the radial pulse.

instrument the radial pulse was obliterated by the pressure of a ball filled with water, and the reading recorded at the point where pulsations disappeared. This instrument was modified and further improved by Zadek.

Both of these observers found the average normal pressure in man to be 130 millimetres of mercury, with variations between 110 and 160. They also recorded that the blood pressure in patients with marked arteriosclerosis might reach 180 to 200 millimetres of mercury, and they noted that in patients suffering a fever the pressure might be as low as 90 or 100 millimetres of mercury.

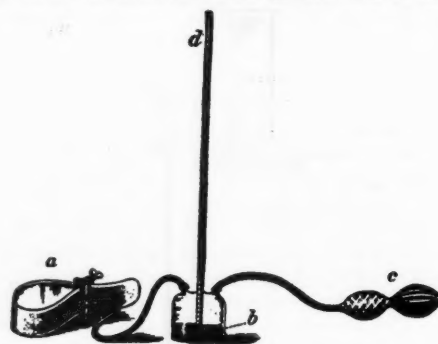
The method of von Basch was essentially accurate, and his observations have received abundant clinical confirmation. In common with other great advances in medicine, the procedure did not at once receive universal approbation from the medical profession of the period, and was held up to scorn and ridicule with the taunt that by such methods "we pauperize our senses and weaken clinical acuity". Such is the

conservation of the common mind of man unwilling to be lifted from its familiar groove.

von Basch's instrument was in turn improved by Potain, who devised a simple portable sphygmomanometer which, for an entire generation, held its place as an instrument of precision in clinical medicine. His instrument consisted of a ball filled with air and attached to an aneroid manometer.

FIGURE IX.  
Potain's sphygmomanometer.

In 1896 Riva-Rocci, at the Italian Congress of Medicine, demonstrated a new apparatus for the estimation of blood pressure, consisting of a rubber bag surrounded by a cuff of inelastic material and connected with a mercury manometer and a rubber bulb. This instrument marked the end of the long

FIGURE X.  
Riva-Rocci's sphygmomanometer.

search for a practical clinical means of recording blood pressure, and was the logical outcome of the researches commenced by Stephen Hales some 188 years previously. It has been altered by the introduction of various modifications, but the principle has met with general acceptance to the present day. Such then, briefly, has been the story of the evolution of the sphygmomanometer, an instrument of precision indispensable to the armamentarium of the modern clinician.

#### Acknowledgements.

Acknowledgement for subject matter and diagrams is made to the following:

Ralph H. Major: "The History of Taking the Blood Pressure", *Annals of Medical History*, January, 1930.

Charles J. Brim: "The Story of Blood Pressure", *Medical Life*, February, 1930.



## BLOOD CULTURES IN THE WORK OF A GENERAL HOSPITAL.

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It occurred to us that the blood culture work done by the Baker Institute in conjunction with the staffs of the Alfred and other hospitals might be of interest to the Clinical Society.

In preparing this review we spent quite a time examining the medical and bacteriological literature of the last ten years, hoping to get material from other hospitals for comparative purposes, and we were struck by the paucity of the reports on this subject. This was disappointing, for we cannot but think that a friendly rivalry between the general hospitals in increasing their percentage of successful blood cultures would occasion a great step forward in diagnosis.

In this work the clinician desires the earliest possible recognition of the infecting organism, the antigen. This recognition must be early so that: (i) specific treatment may be given where such treatment is available, and (ii) the case may be more intelligently handled generally.

The variety of media must be such that any pathogenic organism present in the blood will grow on at least one of the media used. The earlier the growth appears, the better the medium. It is advisable to have the growth occur in two of the media used, if this be possible, for in this way welcome corroboration of a positive result is provided. Needless repetition of blood cultures, owing to the use of one unsuitable medium only, is an unfortunate necessity. For example, if the clinician diagnoses pneumonia in a child which suffers in actual fact from typhoid, then the use of tryptic broth medium rather than a bile medium might occasion unfortunate delay in the diagnosis. Similarly, it sometimes happens that typhoid may be diagnosed in a child and bile medium used for the blood culture, whereas the child really suffers from an acute pneumonia, in which case tryptic broth would be an infinitely more suitable medium in which to carry out the work.

The physician may require to know the number of bacteria present per cubic centimetre of blood, for this is of distinct value in prognosis. Further, in recent years, differential blood culture has been called for, so that the quantitative distribution of organisms in different portions of the circulation may be determined, a method which has been used to localize the infected area.

Naturally, the clinician is extremely desirous that blood culture results should not be complicated by contaminations. McLeod<sup>(1)</sup> has introduced a technique which effectively guards against air-

borne contaminations, but his apparatus is too complex for general hospital work, and provides only for the use of a single medium, so that repeated venepunctures would be necessary if several media were to be used. We believe that the careful use of the syringe and test tube makes elaborate methods, such as those of McLeod, unnecessary.

While the clinician makes all these demands on the bacteriologist, the bacteriologist may reasonably reciprocate and ask for the exercise on the part of the physician of careful judgement when he calls for a blood culture. It is most important that it should be asked for at the appropriate time. For example, in typhoid it should be as early as possible, and that applies generally to diseases in which septicæmias occur. Secondly, as a rule, it should be taken in the febrile period. Only one of our positive blood cultures was taken in an afebrile period of the disease. Perhaps the only exception to this is in tuberculosis, in which it has been claimed that a large number of positive blood cultures has been obtained, though the patients were afebrile.<sup>(2)</sup>

The great bulk of the clinical material we have investigated has been from the Alfred Hospital. A small portion has come from the Women's and Children's Hospitals.

## Technique.

Our own technique at the present time involves the use of three media: (i) Bile. (ii) Hartley's modification of Douglas's tryptic broth.<sup>(3)</sup> (iii) Anaerobic tryptic broth. This is glucose tryptic broth (Harley) *plus* cooked meat sealed with paraffin, to which is added active trypsin one or two days before use. In the interval it is incubated to demonstrate its sterility and controls uninoculated with patient's blood are always incubated along with the cultures. In none of these has there ever been any growth. This broth is especially valuable for the growth of anaerobic streptococci and other anaerobes. Until recently Robertson's cooked meat broth was used for the recovery of anaerobes, but proved itself inefficient compared with the anaerobic tryptic broth we are now using. (See Table II).

## Quantities Used.

*First Culture:* To seven cubic centimetres of sterile ox bile in a test tube 15 centimetres by 1.8 centimetres (six inches by three-quarters of an inch), five cubic centimetres of blood are added.

*Second Culture:* Three cubic centimetres of blood are added to one hundred cubic centimetres of tryptic broth in a Florence flask of 300 cubic centimetres capacity.

*Third Culture:* To fifteen cubic centimetres of anaerobic tryptic broth in a test tube 15 centimetres by 1.8 centimetres (six inches by three-quarters of an inch) are added two to three cubic centimetres of blood.

All three cultures are incubated at 37° C. and examined on the first, second, third and seventh

days, and thereafter twice weekly for four weeks, unless, of course, positive results are obtained at an earlier date.

#### Obtaining the Blood.

We sterilize the skin by washing the area over the vein with 1% lysol solution which has been made up for some time. It is at once a good cleansing and antiseptic agent. The lysol is carefully removed by washing the area with absolute alcohol poured drop by drop from a suitable bottle. Ether from a similar drop bottle is used to remove the alcohol so that we may have quickly a dry area, free from antiseptic, in which to work.

An all-glass syringe is used for taking the blood, as it can be autoclaved with the piston within the barrel without any risk of breaking it. The syringe, with two suitable needles, is placed in a wide glass tube with a little cotton wool at the closed end, on which the syringe and needles are supported. The open end is plugged with cotton wool. The whole is autoclaved so that its sterilization can be absolutely assured. A series of these syringes is kept in tubes always ready for use, so that no time is lost awaiting the sterilization.

The vein, preferably in front of the elbow, is distended by the application of a tourniquet to the upper arm. Voluntary activity of the hand will help to distend the vein, if this should be found necessary in delicate patients. In pricking the vein, care should be taken that the needle does not penetrate its posterior wall, and perhaps lead to the development of a hæmatoma. Before the needle is withdrawn from the vein the tourniquet should be removed so that no unnecessary blood will be spilt into the tissues through the puncture in the vein.

When the blood is being transferred, the test tubes or flasks used to contain the media should be held as nearly horizontal as possible and carefully flamed around their mouths. In this way, if any dust from the air should fall upon the lip of the tube it will be immediately sterilized by heat. When the blood is being introduced into the test tubes or flasks, it should be injected extremely slowly so that no current of air with contaminated dust will be drawn in with it. In order to avoid this, it is not unusual to detach the needle from the syringe so that a wide stream of slow velocity enters the test tube. In all the blood culture work attempted and recorded in this paper contamination by *Staphylococcus albus* has developed in only two single tubes.

#### Results.

Our general results are set out in Table I. They are divided into two groups, Group I consisting of the twenty-three positive results in the first hundred cases in which culture was attempted, and Group II, the thirty-four positive results in the next following hundred cases. The marked rise in the positive results is chiefly accounted for by the fact that on commencing our second group we added to our media anaerobic tryptic broth, which enabled us to cultivate a large number of anaerobic streptococci,

organisms the importance of which has been recognized only in comparatively recent times, very largely through the work of Schottmüller<sup>(4)</sup> in Germany and of Colebrook<sup>(5)</sup> in England.

These anaerobic streptococci were chiefly obtained from cases of septic abortion or from other gynaecological material. One notable exception, however, is worthy of mention as occurring in a case of mastoiditis. In this case the organism was recovered from the cerebro-spinal fluid as well as from the blood; nevertheless, the patient recovered. Anaerobic streptococci are apparently not infrequently found in the normal vagina, and they are believed by some authors to be responsible for some cases of endogenous puerperal septicæmia.

On thirteen occasions the *Bacillus typhosus* was isolated from patients suffering from typhoid. Additional attempts at blood culture were made from three other patients known to have typhoid fever, these three without success. This was apparently due to the fact that the blood cultures were done in the second and third weeks of the disease. Our thirteen positive results were all obtained in the first ten days of the febrile period.

The results obtained in seven cases of subacute bacterial endocarditis show that *Streptococcus viridans* was present in the blood in four cases, and non-hæmolytic (gamma) streptococci in the other three. Two other non-hæmolytic streptococci were found, one in a case of pneumonia complicated by mastoiditis and one in the blood of a patient suffering from puerperal septicæmia. A relatively large number of hæmolytic streptococci were isolated from various types of patients; four were suffering from septic abortion, three from mastoiditis, three from septicæmia without any ascertainable local focus of infection, and one each from osteomyelitis and appendicitis. Staphylococci of the aureus type were isolated from the blood in seven cases; septic abortion (two), and carbuncle, orbital abscess, malignant disease of the thyroid, osteomyelitis and septicæmia in a child (one each). In this latter case no known local focus was found.

The following two cases of mixed septicæmic infection were discovered:

(1) Patient number 20 of the first group, suffering from septic abortion, had both *Streptococcus hæmolyticus* and *Bacillus welchii* simultaneously in the blood stream.

(2) From the blood of patient number 168 of the second group, also suffering from septic abortion, an anaerobic streptococcus and an unidentified anaerobic bacillus were isolated. It is of interest that both our patients with mixed infection of the blood stream were suffering from septic abortion.

#### Mortality.

The mortality rates from these various septicæmias are not without interest. Six out of the twelve patients suffering from hæmolytic streptococcal septicæmia died; three of the eight suffering from anaerobic streptococcal septicæmia also died. It is of interest in referring to these cases to recall Colebrook's experience.<sup>(5)</sup> He found that the anaerobic streptococcal septicæmias were a little

TABLE I.

A summary of the results obtained by blood culture from 57 patients giving positive results.

Group.	<i>Staphylococcus aureus.</i>	Streptococci.				Pneumococcus.	<i>Bacillus typhosus.</i>	<i>Bacillus welchii.</i>	Other Anaerobic Bacilli.
		Hæmolytic.	Viridans.	Non-Hæmolytic Aerobic.	Non-Hæmolytic Anaerobic.				
Group I, 23%.	Case 52 (malignant thyroid)	Case 14 (mastoiditis)	Case 81 (subacute bacterial endocarditis)	Case 11 (subacute bacterial endocarditis)			Case 1	Case 3 (septic abortion)	Case 25 (appendicitis)
	Case 70 (septic abortion)	Case 20 (septic abortion)	Case 89 (subacute bacterial endocarditis)	Case 40 (subacute bacterial endocarditis)			Case 39	Case 20 (septic abortion)	Case 65 (anaerobic pyæmia)
	Case 87 (osteomyelitis)	Case 31 (septicæmia)		Case 69 (subacute bacterial endocarditis)			Case 59		
		Case 35 (mastoiditis)		Case 90 (pneumonia)			Case 99		
		Case 62 (mastoiditis)							
		Case 92 (osteomyelitis)							
Group II, 34%.	Case 101 (septic abortion)	Case 124 (septicæmia)	Case 139 (subacute bacterial endocarditis)	Case 174 (puerperal septicæmia)	Case 123 (mastoiditis)	Case 128 (right-sided lobar pneumonia)	Case 107	Case 146 (septicæmia)	Case 168 (septic abortion)
	Case 113 (carbuncles)	Case 142 (appendicitis)	Case 158 (subacute bacterial endocarditis)		Case 167 (septicæmia)		Case 110		Case 178 (septic abortion)
	Case 115 (orbital abscess)	Case 188 (septic abortion)			Case 168 (septic abortion)		Case 111		Case 180 (septic abortion)
	Case 200 (septicæmia)	Case 189 (septic abortion)			Case 169 (septic abortion)		Case 144		Case 184 (septic abortion)
		Case 196 (septicæmia)			Case 177 (septic abortion)		Case 147		
		Case 199 (septic abortion)			Case 182 (puerperal septicæmia)		Case 154		
					Case 190 (puerperal septicæmia)		Case 157		
					Case 195 (ulcerative colitis)		Case 161		

less fatal than the hæmolytic ones. We also have had this experience in our relatively small numbers.

It is unfortunate that at the present time there are no specific sera available for the treatment of anaerobic streptococcal septicæmia, and there has not yet been any satisfactory classification of these strains. The paper which we subsequently present this evening will show how difficult it is to use serum intelligently in the treatment of hæmolytic streptococcal septicæmia. The specific treatment of streptococcal infections in general, therefore, remains a problem for the future. Of the four patients suffering from mastoiditis complicated by septicæmia, none died. It is generally believed that a septicæmia following mastoiditis is not frequently fatal, and that seems to be supported by our small figures. A very evanescent infection only is produced, probably owing to the small number of organisms which gain access to the blood stream. In this connexion it is of interest to recall that Barlett and Pratt,<sup>(6)</sup> in sixty-four blood cultures taken two hours after tonsillectomy, found streptococci in 6% of their cases.

In three cases *Bacillus welchii* was isolated from the blood. All of the patients in these cases were treated with the specific serum, and all of them recovered.

#### The Necessity for Repeated Attempts at Blood Culture.

It was not infrequently necessary to repeat the attempt at blood culture, sometimes because early attempts had been unsuccessful and sometimes simply to follow the course of the infection. Three illustrative cases may be mentioned.

In Case 40 (subacute bacterial endocarditis) the first three attempts at culture were unsuccessful; the fourth was successful. In Case 146 (a *Bacillus welchii* septicæmia occurring during pregnancy) the first culture yielded *Bacillus welchii*, whereupon specific serum was promptly given on two occasions; a subsequent attempt at culture was unsuccessful. The patient was thought to be cured, but relapsed, and a third blood culture was positive again for *Bacillus welchii*. Persistent serum treatment was then used and the patient recovered. In Case 3 (an abortion complicated by infection with *Bacillus welchii*) the first culture yielded *Bacillus welchii*, whereupon specific treatment was given, and two subsequent attempts at blood culture did not yield positive results.



TABLE II.

Showing the results obtained by means of tryptic broth, Robertson's meat broth, and anaerobic tryptic broth in a series of cases.

Number of Case.	Tryptic Broth.	Meat Broth.	Anaerobic Tryptic Broth.
123	—	—	Anaerobic streptococcus (1 day)
167	—	Anaerobic streptococcus (3 days)	Anaerobic streptococcus (2 days)
168	—	—	Anaerobic streptococcus (4 days)
169	—	Anaerobic streptococcus (3 days)	Anaerobic streptococcus (1 day)
178	—	—	Anaerobic streptococcus (2 days)
182	—	—	Anaerobic streptococcus (3 weeks)
124	Hæmolytic streptococcus (1 day)	—	Hæmolytic streptococcus (2 days)
142	Hæmolytic streptococcus (4 days)	—	Hæmolytic streptococcus (4 days)
196	Hæmolytic streptococcus (1 day)	—	Hæmolytic streptococcus (1 day)
199	Hæmolytic streptococcus (2 days)	—	Hæmolytic streptococcus (10 days)
101	<i>Staphylococcus aureus</i> (2 days)	<i>Staphylococcus aureus</i> (2 days)	<i>Staphylococcus aureus</i> (2 days)
113	<i>Staphylococcus aureus</i> (4 days)	—	<i>Staphylococcus aureus</i> (7 days)
115	<i>Staphylococcus aureus</i> (1 day)	<i>Staphylococcus aureus</i> (1 day)	<i>Staphylococcus aureus</i> (1 day)
200	<i>Staphylococcus aureus</i> (2 days)	<i>Staphylococcus aureus</i> (3 days)	<i>Staphylococcus aureus</i> (3 days)
168	—	—	Anaerobic bacillus (7 days)
178	—	—	Anaerobic bacillus (4 days)
180	—	—	Anaerobic bacillus (1 day)
184	—	—	Anaerobic bacillus (2 days)

NOTE.—The sign "—" indicates failure to grow. The number of days indicates the interval between the taking of the blood and the detection of growth.

#### Comparison of Results Obtained with Different Media.

In Table II are recorded the results we obtained in comparing tryptic broth, Robertson's meat broth and anaerobic tryptic broth in a series of cases.

It is at once evident that anaerobic tryptic broth was universally useful in this group of cases and that the tryptic broth itself, while very good for the hæmolytic streptococci and *Staphylococcus aureus*, has not helped us in the case of the anaerobic organisms. Even the anaerobic cooked meat broth was not very successful with the anaerobes as compared with the meat broth containing active trypsin. We do not, therefore, use Robertson's cooked meat broth now in our ordinary routine. Anaerobic tryptic broth is preferred.

It will be noticed that in the case of infections with the staphylococci and hæmolytic streptococci, occasionally very much earlier results were obtained by the use of tryptic broth than anaerobic tryptic broth. On account of this early growth in some cases, we have considered it advisable to continue to use the tryptic broth.

#### Causes of Failure.

In examining our results with a view to ascertaining the causes of failure in our blood cultures, we find, first, that in one-sixth of the cases the blood was taken during afebrile periods. In the absence of fever a very low percentage of positives is to be expected. In only one of our fifty-seven positive cases was there a normal temperature at the time of taking the blood. Some of the samples of blood were also taken too late in the disease. In three of the sixteen cases of typhoid fever, as we have seen, attempts at blood culture were unsuccessful. The blood samples in these instances were all taken after the fever had lasted ten days.

Again, blood was taken from thirteen patients suffering from pneumonia, all of whom had been ill for more than a fortnight. In only one of these cases was a positive result obtained. The Rockefeller workers,<sup>(7)</sup> on the other hand, were able to get 30% of positive blood cultures in their cases

of pneumonia if the effort were made early in the disease.

The failure in some of our cases may have been due to the taking of an insufficient quantity of blood. This is well known to occur occasionally in typhoid, that is to say, if one or two cubic centimetres are taken, there is no growth, but if ten cubic centimetres are used, a positive result is likely.

Further, some of the septicæmias are undoubtedly intermittent. Streptococcal septicæmias<sup>(8)</sup> have been studied in rabbits and the disappearance of the streptococci from the blood stream has been noted to be followed by a large increase of blood infection. But probably one of our chief difficulties is our very limited knowledge of suitable media. The addition of trypsin has been such an improvement that it would appear to us not unlikely that other enzymes in a sterile active form might also be helpful. Of course, some of the cases were possibly only sapræmias and not septicæmias at all.

#### Comparison with the Results of Other Workers.

The results of routine hospital blood cultures are not frequently recorded. It has been difficult for us, therefore, to get figures for comparison, but during the years 1926 to 1930, inclusive, the South African Institute for Medical Research had 6%, 8%, 13%, 10%, and 8% of successful blood cultures in the respective years, from patients other than those suffering from typhoid. When our typhoid cases are excluded, our percentages become 19 and 28 in the respective groups; so that their positive results seem to be smaller than ours. Whether this is due to the difference in media or the difference in the clinical material, the data given are insufficient to enable us to form a judgement.

#### Summary.

Blood cultures were obtained in 23% and 34% of two consecutive groups of one hundred cases.

If the patients suffering from typhoid are excluded from the series, the percentages become 19 and 28 respectively.



Anaerobes are of very considerable frequency, taking the form of anaerobic streptococci, *Bacillus welchii* and other unclassified anaerobic bacilli, not *Vibrio septique* or *Bacillus oedematiens*.

Excellent results in blood cultures have been obtained by the use of a medium described, containing active trypsin.

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#### FACIAL PARALYSIS.

By PERCIVAL PICKERILL, C.B.E., M.S., F.R.A.C.S.,  
Sydney.

I HAVE made several communications on the subject of facial paralysis to this and other journals in the past, particularly with reference to the treatment of the condition by temporal and masseter muscle grafts. The general impression, however, as far as I can gather, seems to be that too much is claimed for the method. It has never been claimed that the grafting of these muscles into the orbicular muscles of the eye and the mouth, gives a perfectly controllable face, but the improvement when the operation is successfully performed, is very considerable indeed. Far better results are obtained than by any other method, and I have yet to see the patient who regretted having the operation done.

The advantages claimed are: (i) That the face as a whole is stabilized to a considerable extent, having two tonic muscles at least on the paralysed side to oppose those on the normal side; (ii) that the patient is given the power of closing the eye on the paralysed side. This is absolutely definite, and the serious risk therefore of corneal ulceration and conjunctivitis is eliminated.

The improvement in appearance is pronounced. The raising of the lower lid and the consequent hiding of the reddened conjunctiva is of itself a decided advantage, and this is quite independent of muscular contraction. Reference to the accompanying illustrations demonstrates these points. The closure of the eye in these cases, and the retraction of the mouth, are voluntary, but I believe that with constant practice, in time the action becomes almost automatic. The technique of the operation I have previously

described in this journal (May 6, 1928) and elsewhere, and I have had no reason to modify it, except that I find that I am increasingly inclined to favour the use of local anaesthesia, because thereby one can not



FIGURE I.  
Right-sided facial paralysis of obscure origin.  
The patient is attempting to close the eyes.

only avail oneself of the patient's cooperation but can, as it were, better match the tension on the sound side. The amount of local anaesthetic required is surprisingly small, especially if a pool be injected in the region of the *foramen ovale*. I think too,



FIGURE II.  
Showing the condition two years after muscle grafting. The right eye can be closed voluntarily. The facial balance is much improved.

perhaps it is better to undertake the grafting in two stages, the first for the temporal muscle, and the second for the masseter, at an interval of some weeks.

An interesting physiological problem crops up in some cases; it is what I have ventured to call

"impulse spread". In these cases the voluntary contraction definitely spreads from the grafted muscle to the paralysed muscle (the fibres of which can be definitely seen to contract) and sometimes to other

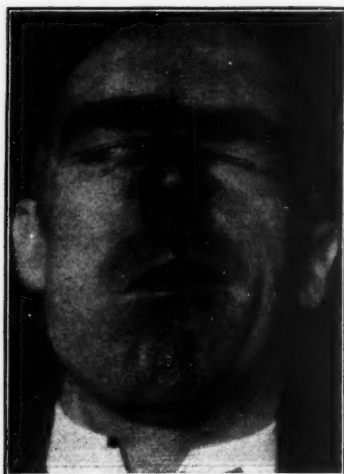


FIGURE III.  
Facial paralysis due to removal of a parotid tumour. The patient is attempting to close the right eye.

muscles. The commonest muscle thus affected is the *orbicularis oculi*, but in one case the *depressor anguli oris* definitely contracts when the masseter slip is contracted. There is no doubt about this,

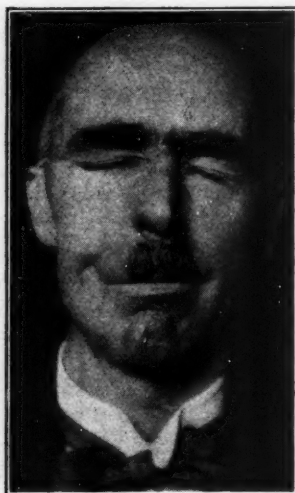


FIGURE IV.  
Showing the condition twelve months after muscle grafting. Note the strong closure of the right eye, and the good facial balance.

and that it was not possible before, is proved by the fact that it was a case in which a considerable portion of the facial nerve had been removed in the treatment of a parotid tumour. Further, the patient was a

medical man, who is very definite that no such contraction was previously possible.

With regard to after treatment, gentle massage and electrical stimulation of the muscle grafts is necessary for some months, and should be commenced three or four weeks after healing of the operation wounds. Only soft diet should be allowed at first, and for one month the patient should be instructed to masticate solely on the normal side. Thereafter gentle voluntary contraction exercises of the masseter and temporal muscles, should be ordered, increasing in frequency and intensity. It seems to take from six to twelve months for the patient to acquire full control of the muscle grafts.

The method, too, has another advantage which I have not previously noted, and which accrues to the patient after treatment is complete. It is the improvement in psychic condition, and feeling of self-assurance for business and social undertakings. This I have not had the opportunity of observing myself, but it has been noted by others and reported to me.

#### TRICHOMONAS VAGINALIS.

By R. FRANCIS MATTERS, M.D., F.R.C.S.E.,  
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DR. E. A. WOODWARD'S<sup>(1)</sup> letter on *Trichomonas vaginalis* and references made to this letter and to Dr. Lethbridge's<sup>(2)</sup> report of a case, have brought the somewhat obscure condition of trichomonas vaginitis into a position of relative prominence.

Of recent years trichomonas vaginitis has become almost epidemic in some parts of the United States of America, and the subject has therefore received considerable attention, both in addresses and in reports in medical literature. At the female night clinic at the Adelaide Hospital patients suffering from this type of vaginitis have from time to time been sent in with a diagnosis of gonorrhoea. The mistaken diagnosis, as in Dr. Woodward's case, is very troublesome, and in some cases the unfortunate woman is the innocent cause of family disruption.

Treatment of trichomonas vaginitis varies with different authorities. R. L. Faulkner<sup>(3)</sup> paints the vagina with a 10% aqueous solution of methylene blue and uses douches of lactic acid in a 1% or 2% solution. Greenhill<sup>(4)</sup> of Cleveland, gives a fairly complete survey of the condition, and he has had excellent results by scrubbing the vagina, vulva and anal region with soft soap liniment. He does this most thoroughly and washes out with water. The parts are then dried and a glycerine tampon is inserted into the vagina. This procedure is repeated every other day for at least eight days. In addition, the patient douches daily with a 0.5% lactic acid solution. Greenhill also stresses the fact that after a bowel movement the anal region should be cleansed by sweeping movements in a posterior direction away from the vagina to avoid any infection which might arise from the anus.

The methods which we have found satisfactory at the Adelaide Hospital are as follows:

1. The vagina is swabbed out with methylated spirits, special care being taken to swab the rugæ.
2. The vagina, vulva and surrounding parts are painted with 2% "Acriflavine" solution, after which a glycerine and "Acriflavine" tampon is inserted high into the vaginal vault through a bivalve or Fergusson speculum. A piece of gauze for withdrawing the tampon protrudes from the vulva. The patient is always advised to wear a diaper to prevent the dye from soiling the clothes.
3. The patient is instructed to douche with a solution of ordinary alum, 6.3 grammes to the litre (one drachm to the pint) of hot water, or a 0.5% solution of lactic acid, twice daily.

The administration of "Acriflavine" and glycerine, in addition to the swabbing with methylated spirits, is repeated daily for five or six days if possible. We find the more frequent repetition of active treatment is better than allowing longer intervals.

The lactic acid solution tends to restore the vaginal flora to normal. It is wise to persist with the administration of lactic acid for two or three weeks after the infusorians have disappeared. It has appeared to us that the alum solution is as effective as the lactic acid solution, except when there has been extensive cervical erosion with its excessive discharge as well. In these cases the lactic acid would appear to produce better results.

For purposes of reference there is a complete treatise published by C. H. Davis<sup>(5) (6)</sup> in 1929.

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#### SKIN COMPLICATIONS OF VARICOSE ULCERS.

By L. P. U. CRIVELLI, M.D. (Paris), M.B., Ch.B. (Melb.),  
Melbourne.

WHAT a nightmare the complex chapter on eczema constitutes to the student of dermatology! The appearances and evolution are so different that, if the disease is classified according to the type, the result is a series of groups, more or less well defined, which overlap and merge into each other. If the classification is according to causation, it can only be an unsatisfactory division into causes, internal and external, which would have no effect on most people, but to which the patient's skin has become sensitized. The diversity of cause and reaction is such that it is difficult to believe that all the manifestations known as eczema belong to the same

pathological process (Darier). One thing seems clear, namely, that eczema is to be regarded, not as the result of an intoxication nor the direct result of irritation, but as an allergic phenomenon or reaction due to intolerance.

In intoxications the toxic dose is the same for all patients, and the lesion or reaction is specific and progressive, and leaves after-effects. In intolerance, on the other hand, the cause may be anything; the dose varies with the subject, the reaction is the same to different causes, and the evolution is in attacks. Therefore, eczema is not a disease nor a group of diseases, but an inflammatory process, special to the skin; it is a vital reaction due to intolerance of the organism to agents which would or might do harm (Darier). Therefore, it is highly important to distinguish it from chronic bacterial infections, which may simulate it.

At the recent congress at Stockholm, one accepted form of eczema, in the types due to external causes, was that due to bacterial irritation. Now the work of Sabouraud has shown that many cases of this type can be removed from the eczemas completely, being really chronic dermatitis and having characteristics which vary with the causative organism. If true eczema supervenes, the condition is not, as is generally thought, an infected eczema, but is due to sensitization of the skin; often any irritation will then produce a patch of eczema at a distance from the original lesion.

#### The So-Called Varicose Eczemas.

Many of the so-called varicose eczemas, especially those surrounding ulcers, are really skin infections; just as skin can become sensitized to irritants, producing true eczema, so, by a similar process, it can lose its normal reactions of defence against bacteria, producing a chronic torpid dermatitis, though the actual mechanism of both is still a mystery (Sabouraud). In the legs, of course, the defects in the circulation caused by varices, and the consequent lowered vitality of the skin, must play an important part.

The chronic skin infections of the legs are mainly (excluding syphilis) due to organisms of three types: (i) Streptococci, (ii) staphylococci, (iii) mycoses. Infections due to the first two are usually grouped together as pyogenic dermatitis; the third, until lately, was seldom recognized. Sabouraud has shown that there is a sharp difference between staphylococcal and streptococcal infections of the skin in the early stages; later, confusion is due to the fact that all forms tend to become superinfected with staphylococci, which mask the original infection.

#### Streptococcal Infections.

The special tendency of the streptococcus is to lodge itself in some fold of skin, forming a patch of intertrigo which may be quite small and unnoticed, for example, between the toes, behind an ear, at the alæ of the nose, and other situations, where it may lie dormant for years, constituting a



focus from which it may spread to parts with lowered vitality, or even over the whole body, giving rise to one form of exfoliative dermatitis. In the folds of skin it tends to remain moist, and is easily recognized as intertrigo, with a characteristic tendency to form fissures, which are a source of pain. But when it spreads to uncovered parts, it forms dry, pink, desquamating areas, usually diagnosed as seborrhœa; yet the scales can be shown to be teeming with organisms. This dry stage may alternate with periods of abundant serous oozing. This chronic streptococcal dermatitis is stirred to activity sometimes, causing erysipelas or lymphangitis, and is a source of danger to the dresser, a scratch being enough to start an acute septicæmia.

#### Staphylococcal Infections.

The staphylococcus has a predilection for the hair follicles, the characteristic chronic lesion being sycosis. Any chronic lesion originating in pustules of the hair follicles is necessarily staphylococcal and never streptococcal (Sabouraud). Also chronic streptococcal infections are always primary, whereas a staphylococcal infection may be primary or secondary; in fact, most lesions tend to become infected secondarily with staphylococci, which often completely mask the original lesion.

#### Mycotic Infections.

The mycoses are ubiquitous; the possibility of sporotrichosis should be ever present in the mind, especially in cases suggesting tuberculosis or syphilis and associated with lesions in other parts of the body. In the legs the mycoses often simulate eczema on the feet or malleoli; or cause extensive ulcers with irregular, undermined, cyanotic edges, and with areas of healing (red, scaly and pitted), associated with other areas of extending ulceration, as in syphilis. The scar is characteristic, being thin, white and irregular, with a line of brown pigmentation round the edges.

#### Treatment.

From a consideration of the diverse infective agents, the apparently erratic behaviour of the skin complications of varices (especially towards ointments) can be understood, provided we glance at the properties of the topical agents.

Many legs, when they first come under treatment, present a fearful appearance and have to be cleaned up before much idea can be formed about them. The cleaning is best effected by means of baths, either emollient (starch, glycerine, bran *et cetera*) or active (alkaline, antiseptic *et cetera*). After this the skin is best treated with astringent or antiseptic lotions. It is not as a rule advisable to use ointments on the legs, where they too often favour extension of the ulcer; but when they are used, they should, for practical purposes, be divided into two kinds: porous and non-porous.

A porous ointment contains one-quarter (to make it soft) or one-half (to make it hard) of inert powder (zinc oxide or talcum). A discharge can percolate through a porous ointment; also it has a

decongesting effect on the skin. There is but a shallow penetration of the active principles, which are added to the required strength in replacement of a corresponding percentage of the inert powder.

Non-porous ointments, on the contrary, are occlusive; they congest the skin and have a deeply penetrating effect. They should always be tested over a small area to make sure they are tolerated.

Ointments are especially unsatisfactory in the treatment of chronic infections, especially streptococcal and mycotic. The best treatment for these is the frequent application of a very weak solution of iodine (1% or 2%), continued for a long time after apparent cure. In these cases, which constitute a kind of localized idiosyncrasy of the skin, which tolerates the presence of organisms without attempting to shake them off, vaccines have little or no effect.

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#### SOME REASONS FOR FAILURE IN THE TREATMENT OF HAY FEVER.

By D. L. BARLOW, M.D.,

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THE treatment of patients suffering from symptoms due to pollen-sensitization, by means of inoculation with solutions of the corresponding pollens, has proved to be very successful when carried out efficiently. There are, however, pitfalls which can be avoided, provided we are aware of them.

The most important appear to be: (i) Failure to discover and deal with complicating factors, such as sinus infection; (ii) incomplete diagnostic tests, resulting in failure to ascertain which pollens are important in the particular case; (iii) inadequate treatment.

In regard to complicating factors, it is always advisable for the patient to be examined by a specialist in order that these may not be overlooked. Sometimes chronic infection of the mucosa of the respiratory passages complicates the condition due to pollen sensitization. In such cases it is usually necessary to employ autogenous vaccines in addition to the pollen injections.

Failure to discover all the offending pollens is probably the most important reason for disappointment in connexion with the treatment of hay fever. This may result from imperfect technique in testing for sensitization, or be due to the incompleteness of the series of pollens used in testing. If the scratch method is carefully performed, and dry pollens are used with a drop of one-tenth normal sodium hydroxide solution, an easily recognized reaction will almost always occur in the presence of sensitization.



The method of using prepared solutions of pollens by the scratch method is not so reliable.

The possible absence of important pollens from the series tested is of very great importance in South Australia, on account of the fact that many of the most important local pollens, especially those from grasses, are not obtainable commercially. Unfortunately many practitioners have relied on such source of supply and have supposed that they were able to obtain a complete range of the important pollens. Instances have been not uncommon in my practice of a patient who has been tested elsewhere with the stock list of pollens without result, subsequently proving to be highly sensitive to pollens which are plentiful locally. In other patients reaction has occurred with one or more pollens, but after ineffectual treatment sensitization has been found to exist to pollens not previously tested.

More than half of the sufferers from hay-fever in this State appear from my experience to be affected by the following pollens: Barley grass (*Hordeum murinum*), wild oat (*Avena fatua*), cultivated oat (*Avena sativa*), brome grass (*Bromus sterilis* and *Bromus madritensis*), wheat (*Triticum sativum*), also rose and yellow broom. All of these are exceedingly abundant in South Australia, and none of them appear on the commercial lists.

Even when a complete diagnosis has been made, inadequate treatment may result in disappointment. Preseasonal treatment is the ideal to be aimed at, and as a rule should be repeated at least once. A dose of three to five milligrammes for an adult should be reached by suitable stages before discontinuing. For the first season, after reaching the maximum dose it is advisable to give a somewhat smaller dose, once per week until the main pollinating season is over. As the injections normally cause no appreciable reaction, the patient is not greatly inconvenienced by so much treatment, and the relief obtainable makes it entirely worth while.

In conclusion, the occasional case strongly resembling hay-fever, but not resulting from pollen sensitization requires consideration. Feathers, animal danders, and drugs may be responsible for the symptoms; the history may give a clear indication of the cause, and in many instances it is possible to avoid the offending substance and thus obtain relief.

#### A FRAME FOR THE TREATMENT OF THE EARLY STAGES OF ACUTE ANTERIOR POLIOMYELITIS.

By D. J. GLISSAN, M.B. (Sydney),

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WHEN the diagnosis of acute anterior poliomyelitis is strongly upheld or confirmed, there is urgent need to secure for the patient the most complete possible measure of rest.

It is wise to anticipate the incidence of paralysis in such important muscles as the deltoid, *tibialis anticus* and the intrinsic muscles of the thumb, by posturing the arm, foot and thumb, and very necessary, if paralysis supervenes, to maintain these postures until recovery is complete or as far estab-

lished as is possible in the circumstances of any given case.

It must be realized that complete body rest is necessary as the basis of general and local treatment, since we are dealing with a general disease whose chief onslaught is upon the anterior horn cells. To posture and splint the foot in a patient with paralysis of the *tibialis anticus* and to neglect general rest is analogous to directing treatment to an area on the leg or foot whither pain arising from a spinal cord tumour is referred, and to neglect the tumour.

A favourite method of securing body rest is to place the patient on a frame with a head-piece and various attachments to allow the upper limbs and the feet to be postured. These frames are costly, frequently very uncomfortable, take time to make, and often require readjustment with its attendant delay before the patient is accurately fitted.

To a practitioner in the country the difficulties in the way of securing such a piece of apparatus quickly and so satisfactorily made as not to require readjustment, are very much greater than they are to his urban or suburban colleague. It is to help the man in the country that I am publishing details of a frame which I designed for my own patients and which I know to be efficient, cheap, and readily made by any handy man or carpenter in a few hours. The necessary covering can be made by the child's mother or a needlewoman without difficulty.

Oregon or pine battens of suitable dimensions are put together so as to make a frame of a length and breadth exceeding the corresponding dimensions of the patient by six or eight inches, the width of the patient being calculated from shoulder tip to shoulder tip.

On one side it is covered by strong, small mesh wire netting tightly stretched. The wire is applied in two sections, a head and trunk section, and one for the lower limbs. A gap is left between the sections and placed opposite the buttocks.

Across this space is fixed stout hessian, canvas or strong ticking in such a way that whilst it is secured permanently to one side of the frame it can be unfastened from the other side and pulled across in order to allow of adequate access to the buttocks for nursing.

A batten is fixed securely across the under surface of the frame, opposite the patient's shoulders. It should extend beyond the frame on each side and an upright piece of batten is morticed into or secured with a bracket to each free end. The width between uprights must be such as will allow the upper limbs to be abducted to a right angle, with the elbows flexed to the same angle and just clear of the uprights. The height of each upright beyond the upper level of the frame must exceed the length of the forearm with fingers fully extended by a few inches. A light cross piece joins the free ends of the uprights, being secured by nails or screws.

Opposite the patient's heels an upright is secured direct to each side of the frame, and a cross-piece extends from the free end of each above.

The cross-piece must be placed so high as to give a clearance of three or four inches to the foot and toes held at a right angle to the leg.

A light mattress is made in three sections of stout calico, filled with kapok, flock or other suitable material. It should be secured like an ordinary mattress by a number of through-and-through stitches so as to secure the filling material and prevent it moving. The first section extends from the top of the frame to the end of the trunk area of wire. The second is of the same width as the covering across the buttock area, and is sewn or otherwise secured to this covering. The third section extends from the upper to the lower end of the lower limb area of wire.

The width of the mattress should be such that when it is placed upon the frame there is about an inch of wire uncovered on either side of it.

A number of lengths of tape are sewn to each side of the upper and lower sections of mattress, and these serve to secure the sections in place when they are tied to the wire on each side.

A stout piece of calico of suitable width can also be similarly secured to the wire on each side. It serves to prevent the child working itself off the mattress and to keep the bed coverings about the child in position.



The child is placed on a strip of blanket laid on the mattress, the upper limbs are abducted to a right angle, the elbows flexed, and by means of a soft cuff of felt or of several thicknesses of flannel suspended at a suitable height from the first described cross bar, the wrist is secured so that the limb is maintained in the abducted position. A small pillow is arranged under the arm so that there is no dead weight of limb hanging in the cuff. With a little care the adjustment can be made so that this position is very comfortable. Thick flannel sleeves keep the limbs warm.

The feet can be maintained at a right angle by slinging them similarly with adhesive plaster applied to the soles and secured to the bottom cross bar. Another method is to bandage them into soft felt slippers which are suspended to the cross bar, allowing the heels just to rest on the mattress.

A bare outline is given of the frame and methods of using it, and it will be found that there is plenty of scope for adaptation to various particular needs.

The patient can be readily transported on the frame, and where a long period has to be spent on it, the frame can be placed on an old perambulator frame and rendered easily mobile.

The accompanying drawing is of a model whose proportions are not accurate and in which the mattress has been made narrower than is advised, in order to show the frame and wire more readily. Instead of wooden uprights and cross-piece to sling the upper limbs, heavy wire has been used in the model.

## Reports of Cases.

### CHLOROFORM ANÆSTHESIA.

By R. W. HORNABROOK, M.B., B.S. (Adelaide),  
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Melbourne.

THE series of experiments during which the cardiographs accompanying this article were taken, are the outcome of a personal effort to demonstrate that there is a distinct advantage in the administration of a hypodermic injection of atropine prior to chloroform administration, and also that the sitting up or head and shoulders raised position during chloroform induction is not disadvantageous, but rather the reverse.

These experiments were carried out on three separate dates at the Walter and Eliza Hall Institute at the Melbourne Hospital, and the cardiographs are the work of Miss Maudsley. All the experiments were carried out upon myself, the dates being October 2, 1930, October 10, 1930, and November 19, 1930.

The first two series of experiments were carried out without the preliminary injection of eight milligrammes (one-eighth of a grain) of morphine and 0.43 milligramme (one one-hundred-and-fiftieth of a grain) of atropine. In the second series of experiments I was tired, having been through a strenuous morning's work, and it was during this second series that my condition rather scared those present. I made, however, a rapid recovery, but the experiment demonstrated that it is certainly not wise to administer chloroform to a tired patient, at least, not without any preliminary of morphine and atropine. The third series followed upon a preliminary injection of one-eighth of a grain of morphine and one one-hundred-and-fiftieth of a grain of atropine, and my pulse rate continued practically normal throughout, only quickening up slightly when an incision about three inches long was made in my forearm.

In my own work I use chloroform as an aid to all my inductions, and I am most particular that the patient must be in a comfortable position, with head and shoulders raised during induction. In my dental cases the patient reclines in the dental chair in a nearly upright position, in the position most convenient for the dentist. I am not in the least worried by having to use chloroform with this position; in fact, I would refuse to induce anæsthesia with chloroform in any patient lying flat or with the head low.

There is a considerably greater likelihood of a patient struggling or moving during induction in the head low position than there is with the head and shoulders well raised or in the semi-upright position. It is the struggling stage that is the dangerous stage during induction—it immediately throws up to a marked degree both pulse rate and blood pressure, and may seriously damage a weak heart or bring about a fatality. The most robust of men will go off quietly in a comfortable head and shoulders raised position, that is, if the anæsthetist does not attempt to "uppercut" his patient into a stage of unconsciousness by rushing his anæsthetic and giving the patient the sensation of suffocation.

#### Report of Miss Maudsley.

##### A.—Without Atropine or Morphine.

(1) Lying down. When the patient is unconscious *T* is diminished in amplitude in all leads, being inverted in

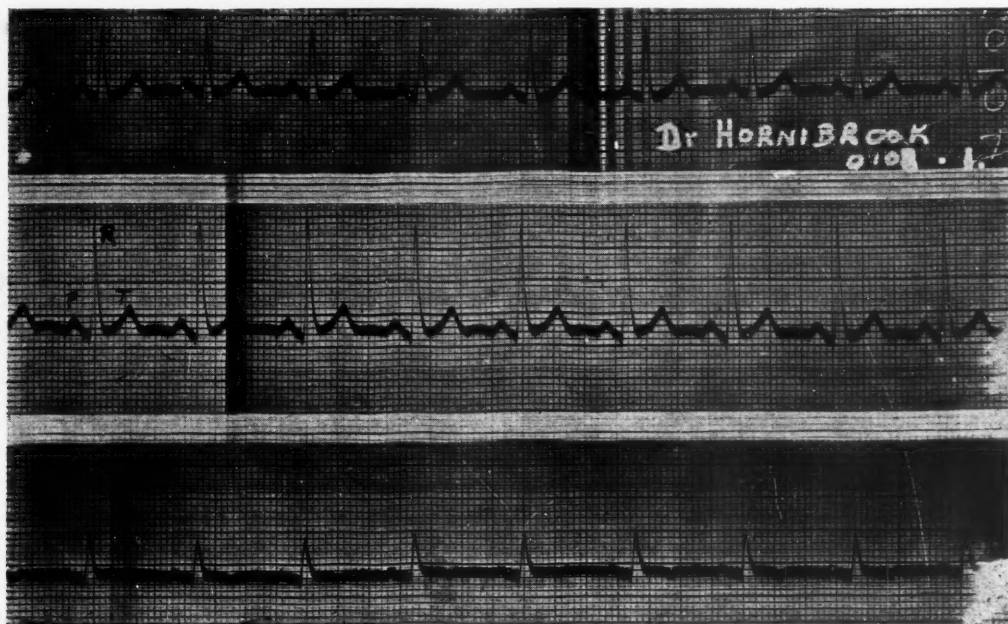


FIGURE I (Series 1).

Chloroform administered to patient sitting up in bed. Pulse rate per minute, 86.

III. *P* is slightly increased. The rate rises from 85 to 109 per minute.

(2) Sitting up. The patient was tired. Soon after becoming unconscious a nodal rhythm was established, the rate falling from 75 to 47 per minute; subsequently, before consciousness was regained, a normal rhythm returned, with a rate of 73, which rose to 86 with consciousness.

*B.—With Atropine and Morphine.*

Sitting up. There is no change in the form of the curve when unconscious; the rate rises from 73 to 93 and falls to 62 with return of consciousness.

**Report of Professor W. A. Osborne.**

Dr. Hornabrook's experiment and the electrocardiograms obtained during the period when his circulation was faulty

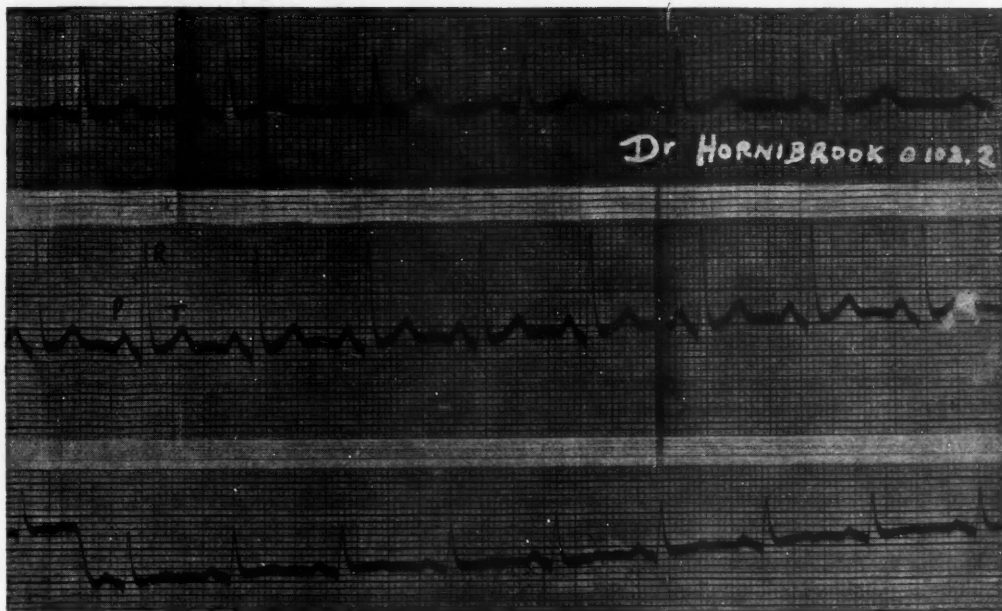


FIGURE II (Series 1).

Chloroform administered to patient lying down in bed. Pulse rate per minute, 85.



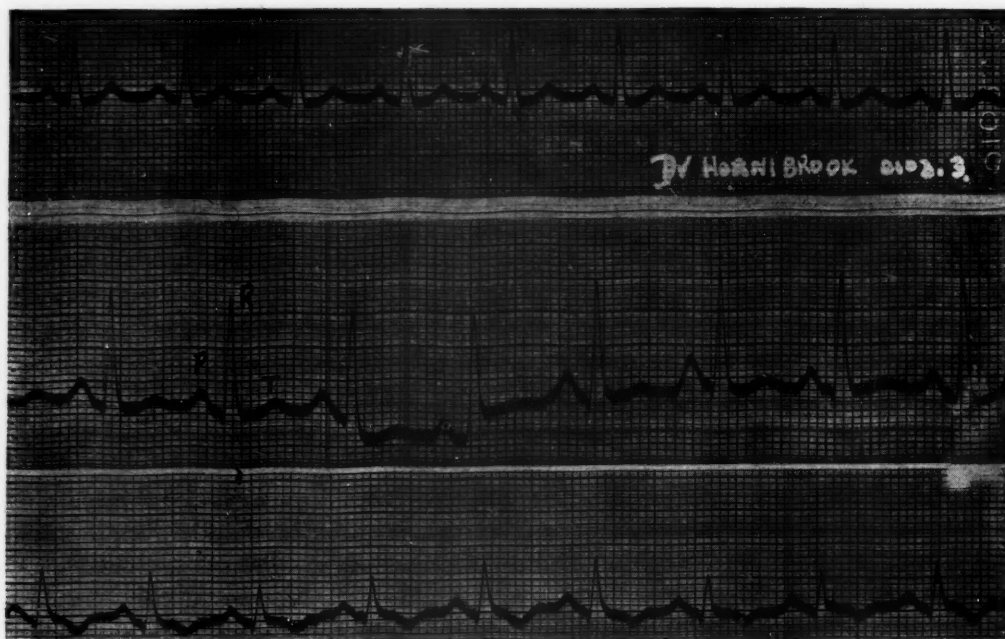


FIGURE III (Series 1).

Lying down immediately after becoming completely relaxed under chloroform. Pulse rate 109. In Lead II *P* is increased in amplitude, while *T* is decreased. In Lead III *T* is inverted and *P* is increased. There is a variation in the amplitude of *R*, most marked in Lead III.

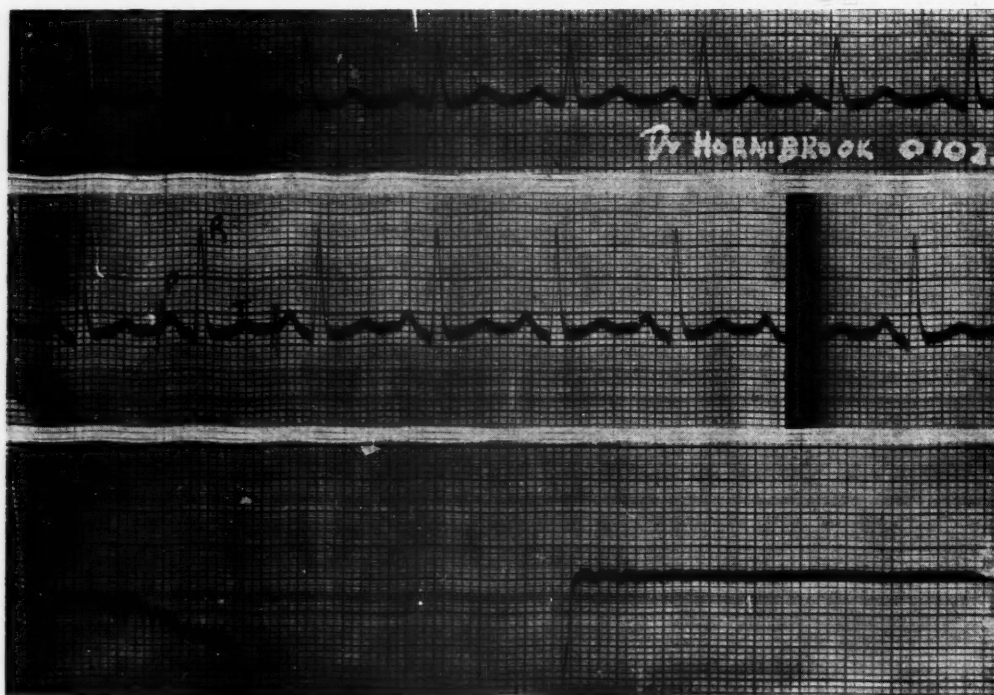


FIGURE IV (Series 1).

Lying down, just regaining consciousness; during Lead III the patient sat up, so that it is impossible to tell if *T* in Lead III were still inverted. Pulse rate, 103 per minute. In Lead II *T* is still decreased in amplitude, but *P* is similar to *P* in the control curve. Between the taking of Figure III and Figure IV there were several ventricular extrasystoles.



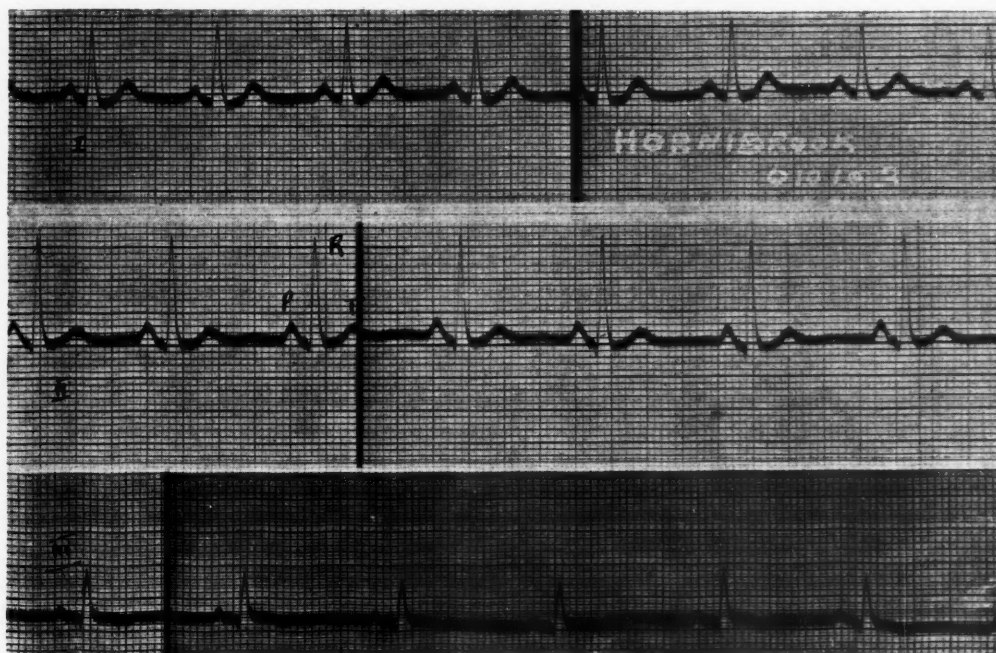


FIGURE V (Series 2).

Normal control curve prior to chloroform administration. Pulse rate, 75 per minute. Vertical lines represent one-twenty-fifth and one-fifth second.

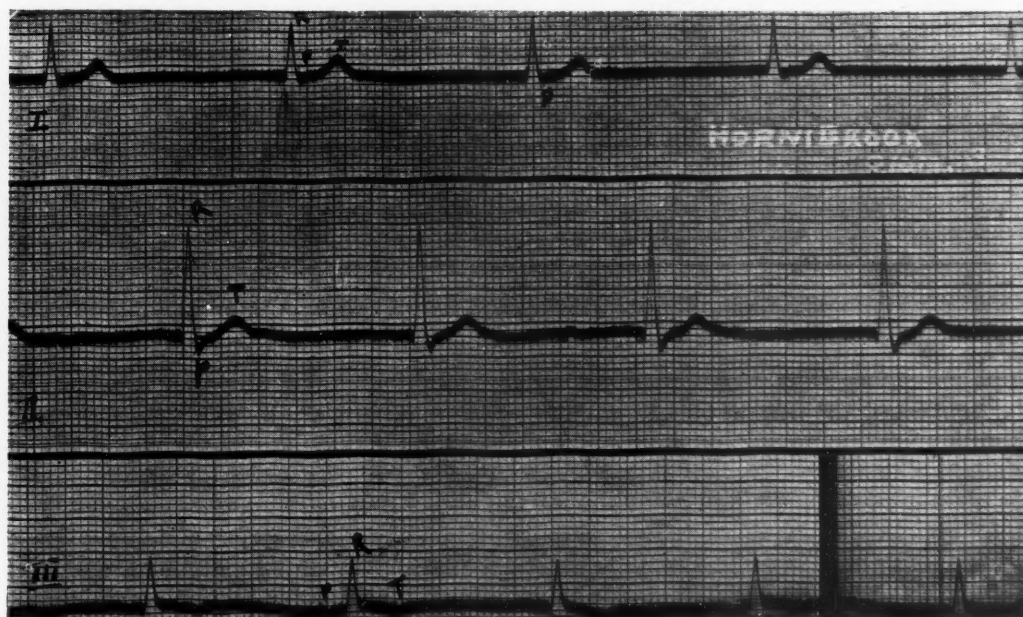


FIGURE VI (Series 2).

Under chloroform, the patient being unconscious and relaxed. Taken in the order III, II, I. In III *P-R* is diminished, *P* is inverted, the pulse rate is 56 per minute. In II there is an *R-P* interval; *P* is inverted and the pulse rate is 48. In I there is an *R-P* interval; *P* is inverted and the pulse rate is 47. This shows nodal rhythm. The pacemaker in III is high in the auriculo-ventricular node, while in II and I it is at the lower end of the node, but above the branching of the bundle. It was during this administration, when the pulse was slowed, that the patient became "blue white". The patient had been through a fairly strenuous morning's work prior to administration and was tired. Vertical lines represent one-twenty-fifth and one-fifth second.

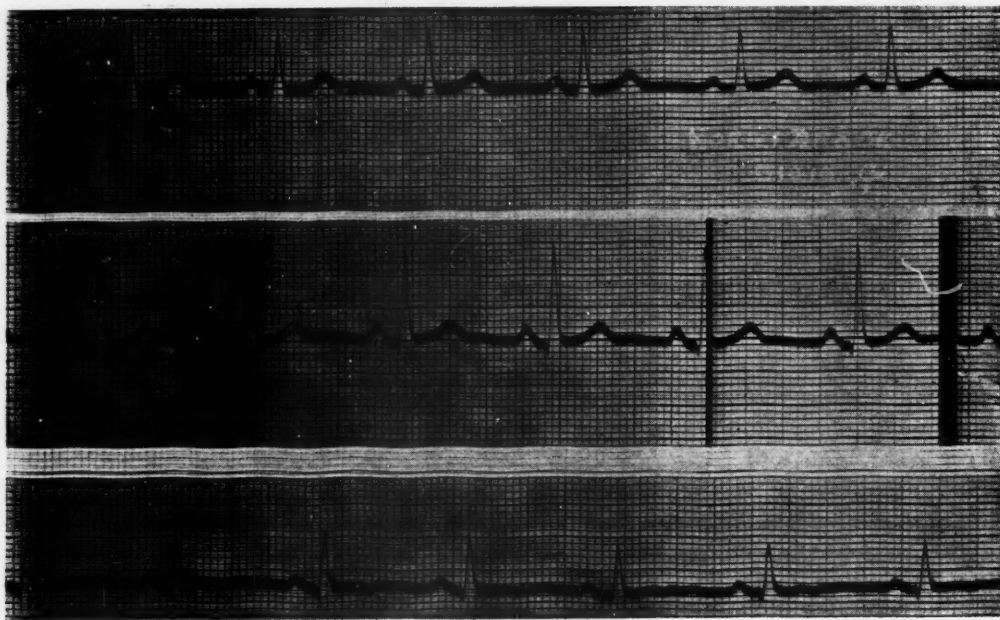


FIGURE VII (Series 2).

This was taken soon after II; the rhythm is normal and the pulse rate 73. Vertical lines represent one-twenty-fifth and one-fifth second.

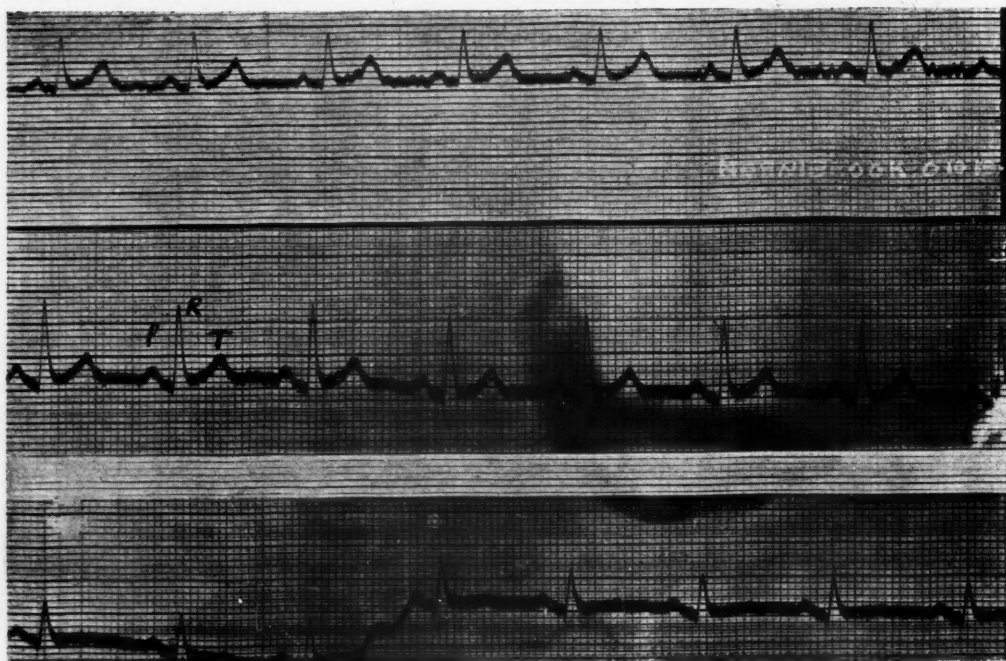


FIGURE VIII (Series 2).

This was taken some minutes after the patient had regained consciousness. Vertical lines represent one-twenty-fifth and one fifth second.

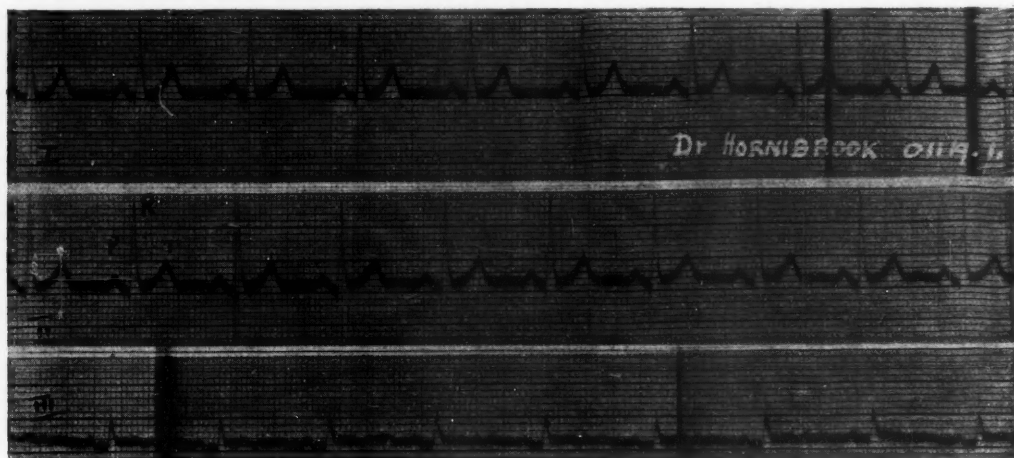


FIGURE IX (Series 3).

Before chloroform administration, but after injection of one-eighth grain of morphine and one one-hundred-and-fiftieth grain of atropine. The pulse rate is 73 per minute.

open up a new chapter, it appears to me, in the pharmacology of chloroform. Hitherto, in dealing with the effects of this agent on the heart, we have turned our attention chiefly to the direct poisoning action on the myocardium. When vagal excitement is thought of, it is invariably in terms on chronotropic change.

In Dr. Hornabrook's case the main cardiac disturbance was the change of site of origin of the systole from the normal sino-auricular node to the auriculo-ventricular node.

This means that the ventricular systole in both chambers was not preceded by an auricular systole. We are just beginning to understand from the dynamics of the heart how important the auricular prelude really is. Robbed of this preparatory action, the ventricular output is reduced and there is no compensatory quickening, but the reverse, or very obvious slowing. The sudden onset of the circulatory disturbance in Dr. Hornabrook and its quick relief, both of which I witnessed, would tend to the view that this nodal rhythm was of vagal origin. This is, I think, an entirely new idea and surely a very important fact in the study of chloroform anæsthesia. If the shifting

of the site of origin of the systole from the normal position is due to vagal action, then we are justified in assuming that this disturbance will be prevented by previous administration of atropine.

#### Report of Dr. H. Hume Turnbull.

I am returning your paper with thanks. It is, I think, very interesting and valuable. The electrocardiograms which are abnormal, are, I think, examples of alteration of pacemaker in the node, as Miss Maudsley suggests, and are probably vagal in origin, and not an indication of cardiac muscle weakness. This is suggested both by their type and the fact that they soon disappear in spite of continued administration of anæsthetic, which would hardly be the case if they were due to poisoning of muscle by the drug.

#### Comment.

The two outstanding points brought to light in connexion with these cardiograms are:

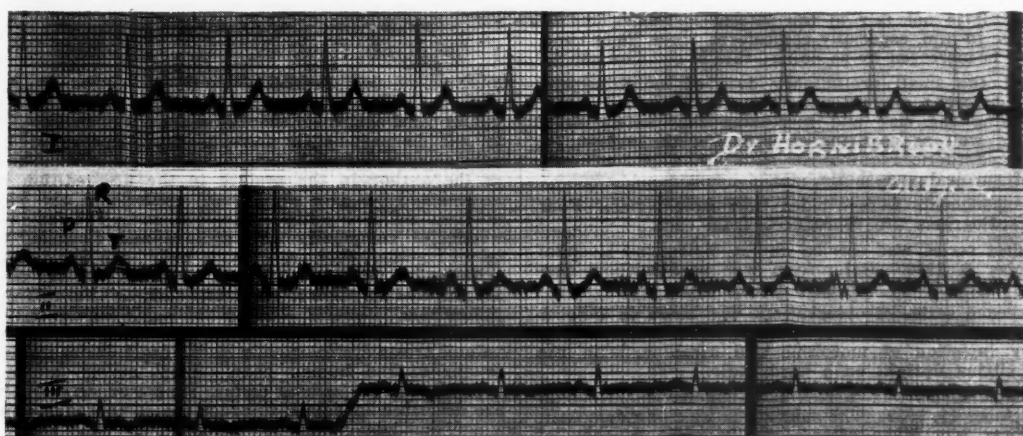


FIGURE X (Series 3).

Reviving after first administration of chloroform. Tremor due to movement. The pulse rate is 80 per minute.



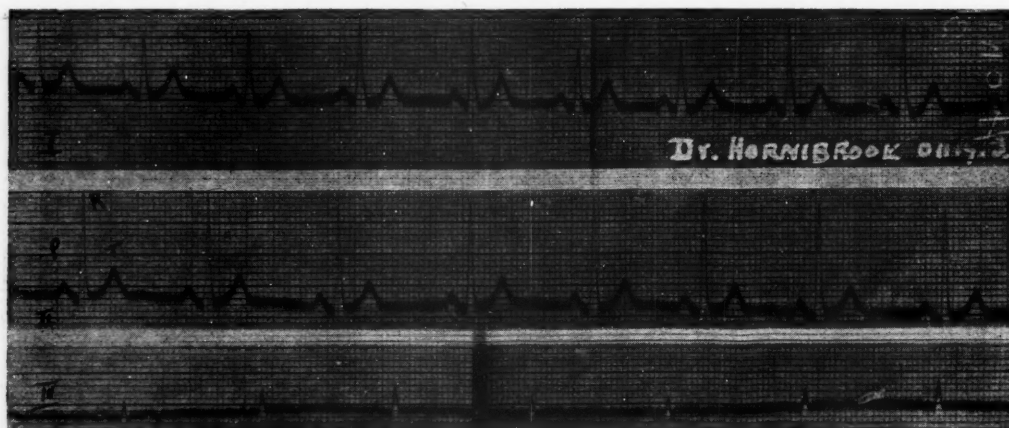


FIGURE XI (Series 3).

Unconscious with second dose of chloroform. Incision made into arm during Lead II. The pulse rate is 93 per minute.

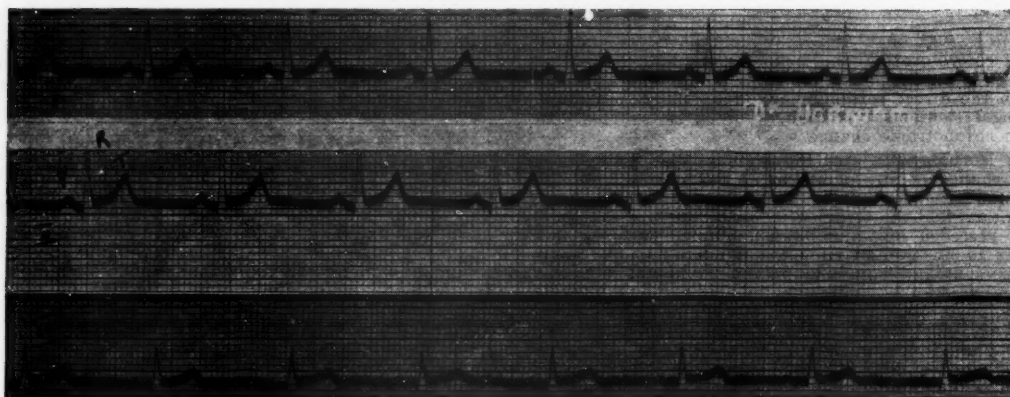


FIGURE XII (Series 3).

Recovering from chloroform. The pulse rate is 62 per minute.

1. That it is not fair to the patient to administer an anæsthetic to him, especially chloroform, when he is tired. The risk is increased by so doing; this is common sense.

2. That the small preliminary dose of morphine and atropine before a general anæsthetic is a decided factor in lessening the risk and increasing the "safety first" factor, as well as assisting in reducing the amount of general anæsthetic required to maintain a patient in a stage of surgical anæsthesia.

The experiments were divided into three series. Four electrocardiograms are reproduced from each.

The first series was carried out at Melbourne Hospital on October 2, 1930. Chloroform was used without preliminary injection of morphine and atropine.

The second series of observations was made on October 10, 1930. Chloroform was administered without preliminary injection of morphine and atropine, with the subject sitting upright on a hard chair.

The third series was carried out at Melbourne Hospital on November 19, 1930. The subject sat up in an armchair. Chloroform was given after a preliminary injection of eight milligrammes (one-eighth of a grain) of morphine and 0.43 milligramme (one one-hundred-and-fiftieth of a grain) of atropine.

## Reviews.

### PHYSIOLOGY.

THE third edition of the "Manual of Human Physiology", by Sir Leonard Hill, presents the elements of human physiology in a sound and interesting manner.<sup>1</sup> The book, as the author in the preface to the first edition states, is designed "to give the general reader and one who has not received a scientific education, some insight into the wonderful complexity of structure and function which, taken together, compose a living man". In this the author achieves his purpose admirably. The introductory chapters are devoted to general problems, such as life, sun energy, protoplasm, bacteria, cell physiology, differentiation of structure and function, whilst the main portion of the volume treats systematically of the functions of the various organs of the human body. Emphasis is laid on the necessity for performing certain simple experiments, which are described in detail, in order that a thorough apprecia-

<sup>1</sup>"Manual of Human Physiology", by Sir Leonard Hill, M.B., LL.D., F.R.S., Hon. A.R.I.A.: Third Edition; 1931. London: Edward Arnold. Crown 8vo., pp. 476, with illustrations. Price: 6s. 6d. net.



tion of the theoretical discussion may be obtained. These experiments, though simple to perform, are well selected and most illuminating.

Such elements of anatomy and histology as are necessary for the appreciation of the general structural character of the organs, are discussed as an introduction to the study of their physiology. The pituitary gland is perhaps worthy of a little more space devoted to a discussion of its manifold functions.

Reference must be made to certain statements of doubtful accuracy. On page 270 appears the following sentence: "In cases of patients unable to take food by the mouth it is possible to maintain life for some little time by injecting egg white, starch solution and meat juice into the rectum." There appears to be little clinical or physiological evidence that these complex compounds are of any value to a patient when administered rectally. As they are so frequently evacuated after undergoing putrefactive or fermentative changes in the bowel they only add to the nursing difficulties associated with such unfortunate sufferers. Again, on page 320 we are told that "we know of no change taking place in a nerve during the passage of an impulse except in its electrical condition". This surely is not the latest scientific pronouncement on this problem.

The book is profusely illustrated and can be heartily recommended for use in schools and for nurses undergoing hospital training.

#### PUBLIC HEALTH AND THE PRIVATE PRACTITIONER.

THERE is in the United States of America a foundation known as the Milbank Memorial Fund, which in 1923 instituted the New York Health Demonstrations. These comprise three separate projects in intensive community health administration in New York State. These projects met with some opposition from certain sections of the local medical profession, and in consequence the trustees of the fund became seized with doubts lest their philanthropic services in the field of public health should clash with the legitimate professional aspirations of private practitioners. As a result they commissioned Sir Arthur Newsholme, formerly Chief Medical Officer of the Local Government Board of England and Wales, and now lecturer in public health at the Johns Hopkins University, to make a study throughout the world of the relation existing between the private and the official practice of medicine, with special reference to the prevention of disease.

The results of this survey have been embodied in "International Studies".<sup>1</sup> Volume III, which has recently been received, deals with the problem as it affects England, Wales, Scotland, and Ireland. The various countries on the continent of Europe are dealt with in the first two volumes, and there will be a concluding volume which will summarize for the general reader the subjects as illustrated in the accounts of the countries surveyed.

The volume under review is thus merely part of an, as yet, incomplete work; but considered as a separate entity it presents a remarkably comprehensive and detailed account of the very complex systems of public medical and ancillary services which have been evolved in Great Britain and Ireland during the past hundred years, and of the manner in which they affect the private practitioner. Beginning with an outline on the general methods of government in England and Wales, Part I includes a succinct account of the organization of the medical profession in Great Britain and Northern Ireland. The general medical services are next described in three chapters dealing respectively with voluntary hospitals, official medical assistance for the necessitous, and the English Sickness Insurance Medical Service. The chapter on hospitals contains a most informative account of the workings of various contributory schemes, worthy of close

study by all who are concerned in any way with the establishment and guidance of such schemes in this country. Four chapters deal with maternity, child welfare, and school medical services, and four with special medical services, such as tuberculosis services. In Part II is described in further detail six local medical services in England, each having a chapter to itself. Naturally the most comprehensive is that of the County of London. Perhaps the most surprising is that on the Borough of Swindon, where at least two-thirds of a population of 65,000 are provided with a full-time medical and dental service on a contributory basis, a plan that has been in operation for eighty-five years.

Part III deals with Scotland, and embraces six chapters, one devoted to general administration, one to sickness insurance, and four to special local medical services. Part IV is a single chapter on Ireland. This is the least satisfactory portion of the volume. Northern Ireland and the Free State, politically separate entities, are sometimes treated as separate units, sometimes as one country; the result is somewhat confusing.

The volume is essentially a work of reference. Few would purchase it to place on their shelves; not many would have the time or inclination to study it; yet it is a book which should be within reach of all practitioners interested in the development of their profession. Remote from the rest of the world as Australia is, it is hard for the general practitioner to realize what developments affecting the conditions of practice are taking place overseas. We are apt to consider ourselves somewhat advanced in matters of social legislation. Sir Arthur Newsholme's study brings home to the reader the fact that, in comparison with Britain, our public health administration is in many respects in an elementary stage of development, and that official medicine here plays a very minor part in the daily life of the general practitioner. But developments overseas are apt to have their reflex here, and for this reason one feels that as many as possible should study this work, which should undoubtedly be on the shelves of every medical and parliamentary and municipal library.

The volume is attractively presented. The printing is clear, on good paper. Tables and graphs are simple and easy to grasp. The book is free from footnotes, and is moderately well indexed.

#### REJUVENATION.

AN English translation of Dr. Peter Schmidt's German work on rejuvenation has recently been published.<sup>1</sup> The author begins with a brief history of the idea and then proceeds to a short survey of the functions and interrelations of all the ductless glands, discussing in detail the work of Steinach on the interstitial cells of the sex glands. It will be remembered that Steinach showed that ligation of the *vas deferens* led to atrophy of the seminiferous tubules and hypertrophy of the cells between them, which are believed to produce the testicular hormone. After showing the importance of ovarian and testicular hormones by relating animal experiments, the author describes the various methods that are employed to effect reactivation in men and women. These consist chiefly of vaso-ligation, gland transplantation, albugineotomy, diathermy and X rays. Then follows a number of very full histories from the case books of the author and other surgeons. The rest of the book is occupied by a general discussion of the subject and of the physiological and psychological effects of coitus. At the end of the volume are many striking photographs of men and animals before and after operation.

The chief thought that arises from a perusal of this work is that it is no longer possible for an unprejudiced mind to ignore or slight the results that have been obtained in this field. The author's enthusiasm occasionally leads

<sup>1</sup> "International Studies on the Relation Between the Private and Official Practice of Medicine, with Special Reference to the Prevention of Disease", conducted for the Milbank Memorial Fund, by Sir Arthur Newsholme, K.C.B., M.D., F.R.C.P.; Volume III; 1931. London: George Allen and Unwin Limited. Demy 8vo., pp. 558. Price: 21s. net (English price).

<sup>1</sup> "The Conquest of Old Age, Methods to Effect Rejuvenation and to Increase Functional Activity" by Peter Schmidt, M.D., translated by E. and C. Paul; 1931. London: George Routledge and Sons Limited; Sydney: Moore's Bookshop. Royal 8vo., pp. 314, with 40 full-page plates. Price: 21s. net.

him into loose thinking and careless writing, but, after making all allowances for this, the positive evidence he produces of the value of the treatment is very convincing.

He proves conclusively that suggestion can play little part in the results obtained. The objection to putting new wine into old bottles he meets by the demonstration that the bottles themselves are renewed. Those who are most sceptical as to this should be impressed by the experiments of Weisner and Ruzicka. Apart from the restoration of potency, the new growth of hair, lowering of blood pressure, greater muscular strength as measured by the dynamometer, increased capacity for mental and physical work, and increased basal metabolism, are among the objective signs that a profound change has been wrought in the organism by the treatment. Moreover some of the case reports are of people still enjoying the renewed vigour conferred on them by the operation eight or more years ago.

Dr. Schmidt, however, does not allow his enthusiasm to impair his judgement. Although he agrees with other surgeons that over 80% of properly selected patients are greatly improved by the treatment, he still insists that it is far from being a panacea, and is useless if applied to patients whose tissues are gravely diseased or degenerated, or whose disabilities are psychological.

The idea of rejuvenation has been in disfavour owing to the widespread inhibitions that still prevent many from considering dispassionately anything connected with sex. The absurdity of the claim that scientists are impartial was shown by the disgraceful scene that ensued when Voronoff attempted to read his first paper in France. There are signs that the public is adopting a more natural and liberal attitude towards sexual matters. In the hope that that attitude will allow it an unprejudiced examination, this book is commended to Australian readers, both lay and medical. We wish, however, a short shrift to the translators' etymological monstrosity "ineretion".

## Analytical Department.

### "LACTONE" SYRUP.

THE artificial feeding of infants is frequently a matter of serious concern to parents and to physicians. The work of the American investigators, W. McKim Marriott and L. T. Davidson, has in recent years shed valuable light on the problem. Though some young infants may be satisfactorily fed on whole undiluted cow's milk, given in the same amounts as human milk, the majority, when so fed, fail to thrive.

When cow's milk is fed to infants the hydrogen ion concentration at the height of digestion is less than when an equal amount of breast milk is taken. There is more buffer material (such as the phosphates and calcium caseinate) in cow's milk than in human milk, and the acidity of the gastric contents after such a feed is low. This lowering of acidity impairs the digestive process in the stomach.

It is desirable, therefore, to acidify the cow's milk in order to approximate to the conditions occurring in the digestion of human milk. There are definite objections to using hydrochloric acid for this purpose. Lactic acid has been found to serve very well to neutralize the buffer of cow's milk, and in reasonable amounts it is free from any harmful effects. Milk containing 0.5% to 0.7% of lactic acid does not neutralize the acid of gastric juice to any greater extent than human milk, and infants are able to tolerate large amounts of lactic acid milk. Moreover, the acid exercises an inhibiting effect on bacterial growth in the milk to which it is added.

Marriott first used whole cow's milk artificially soured by inoculation with lactic acid producing organisms. The preparation of the food in this way is not free from difficulties; and a better method was found to be the addition of lactic acid to sterilized milk. Carbohydrate

in the form of commercial corn syrup was added to the lactic acid milk to make up the deficiency in sugar content of cow's milk.

In 1925 Messrs. F. H. Faulding and Company, Limited, began working in their Adelaide laboratories on the preparation of a mixture of lactic acid and syrup which would be suitable for adding to cow's milk for infant feeding, and in 1927 "Lactone" Syrup was placed on the market.

The process of manufacture has been investigated by our representative.

Marriott's method of acidifying cow's milk is to add the lactic acid drop by drop, stirring it into the milk. Drops, however, are variable in size, and accurate measurement of acid dosage is impossible by this method. In "Lactone" Syrup the acid is intimately mixed with the viscous syrup, and stirring in of the mixture results in gradual addition of the correct amount of acid with no difficulty.

The substances used in the preparation of "Lactone" Syrup are lactic acid (Merck's 72% pure acid) and maize syrup. The latter is an Australian product, and contains 82% of carbohydrate. Dextrose and maltose constitute 42% and dextrin 40%.

Each batch of acid and syrup used is carefully tested by Messrs. Faulding and Company's analytical staff, and due care appears to be taken that the substances are of correct constitution and that no contamination occurs.

The mixing of measured quantities of acid and syrup is done in a large enamelled container warmed to 60° C. to facilitate mixing. The process occupies about two hours.

Before bottling, a sample of the mixture is taken. The acidity is measured by titration of a specimen with normal sodium hydroxide solution, and, if necessary, suitable correction is made so that the final product contains fifty minims of lactic acid per fluid ounce of syrup.

The specific gravity of the mixture is also taken. This should be 1.355. Finally, an ounce of the mixture is added to cow's milk in the manner of preparing it for the infant, and microscopical examination for size and structure of curd is carried out.

Throughout the process of preparation of the mixture, and also in the various analytical procedures, an observer is struck with the cleanliness and carefulness with which the workers perform their duties. Proper safeguards are taken to insure a standardized and wholesome product.

The acid-syrup mixture is strained and bottled. On the label is a batch number, and if any irregularity occurs, the records of the tests of the batch can be investigated.

The factory authorities informed our representative that on one or two occasions nurses and others using "Lactone" syrup for the first time had found that the curds formed in the milk were excessively bulky. In each instance the trouble arose from non-observance of the instructions on the bottle, that after boiling the milk should be quickly and adequately cooled. Only when "Lactone" Syrup is added to warm milk is a heavy curd formed. Apart from this minor and easily remedied trouble, no complaints have arisen. The necessity to cool the milk well and to stir in the acid-syrup rapidly are two important points to be observed.

Messrs. Faulding and Company also prepare "Lactone" Syrup with maltose. The addition of the small amount of maltose makes the "Lactone" Syrup more suitable for constipated infants.

If cow's milk is not obtainable, "Lactone" Syrup may be used in conjunction with dried milk. The addition to the dietary of orange juice or similar substance containing vitamin C is desirable in acid-milk feeding of infants.

"Lactone" Syrup has been used extensively in South Australia and Victoria, and many medical practitioners have expressed their satisfaction with the results of its use. Reference will be found to "Lactone" Syrup in "A Guide to Infant Feeding", compiled by Dr. Vera Scantlebury, Director of Infant Welfare, Victoria, and presented at the Third Session of the Australasian Medical Congress (British Medical Association), 1929.

It may be concluded that "Lactone" Syrup is a carefully prepared product and is an adjunct of proved value in infant feeding.

## The Medical Journal of Australia

SATURDAY, MARCH 26, 1932.

*All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.*

*References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.*

*Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.*

### EDUCATING THE PUBLIC.

IN any discussion on preventive medicine reference is invariably made to the education of the public. The phrase, like some others that are used in medical discussions, has become stereotyped, with the result that it often expresses a pious hope rather than a determination to do anything definite. Education can be carried out only by teachers who know their subject. If, therefore, the people are to be taught anything about disease, how they are to order their lives that disease may be avoided, how they are to recognize its early manifestations, and how they may obviate its sequelæ, the teaching must be done by medical practitioners. It would appear at first sight that this work is the duty of public health officials and to a certain extent this view is correct. At the same time individual practitioners and bodies such as the British Medical Association cannot leave all the teaching to paid servants of the State. At present a certain amount of teaching reaches the public through various channels, but the teaching either lacks continuity or does not bear the *imprimatur* of the large body of the medical profession. In these circumstances

reference will be made to two methods only which should be exploited—the written word, either in daily newspapers or in a special popular journal, and the spoken word from broadcasting stations.

Articles on health for the general public must be written by someone skilled in writing for the daily Press. The most skilled clinical teacher of medical students and the most erudite author of articles appearing in medical journals will more often than not produce "copy" which the public will not read. The public reads for interest and amusement and not for instruction. The pill of instruction must be sugar-coated. This has been proved more than once by the refusal of newspaper editors to repeat the experiment of publishing articles by specially selected writers. While the difficulty of selecting authors for articles of this description may be left in the hands of newspaper editors, medical practitioners who are able to clothe medical facts in popular language, should use the gift.

Useful though articles in the daily Press may be, it has long been felt that a popular health journal should be published by the medical profession. Some years ago arrangements were made for the publication of a journal of this kind by the Australasian Medical Publishing Company, Limited, but financial considerations led to abandonment of the proposal. There is no reason why a popular health journal should not be started by a non-official medical body or even by non-medical persons. If non-medical persons undertook to publish a journal, they should appoint a medical editor, they should conform to the ethical standard of the medical profession and, by offering a place on the controlling board or committee to an official representative of the medical profession, they might obtain official approval and possibly support.

Broadcasting stations have come to stay. They are popular with the people. They are used for dissemination of news and for the exposition of all sorts of subjects as well as for amusement. They should also be used for health instruction. In England and in some parts of Australia health talks have been given "over the air", in some places regularly, in others only on special occasions, such as health week. In Melbourne a departmental



medical officer gives lecturettes under his own name; in Sydney a member of the New South Wales Branch of the British Medical Association uses what might be called a *nom d'air* to conceal his identity. In both instances experience has shown that people have made use of the information; they frequently write for further explanation or ask for a talk on a particular subject. It would give weight to the teaching coming from broadcasting stations if the Branches of the British Medical Association had some official connexion with the broadcasting arrangements, either by general approval or by the appointment of a subcommittee to overlook the matter. If any official approval were given by the Branches, several provisions would be necessary. In the first place the speaker, unless he were a health official, and not necessarily then, would not allow his name to be disclosed—there would be no question of personal advertisement. Secondly, it would be wise to restrict any such arrangement to "A" class stations. The "A" class stations supply what is called the National Broadcasting Services. They are at present operated by a company, but in a few months will probably be under the control of the proposed Broadcasting Commission. "B" class stations are privately owned and derive their revenue from advertisements. In the absence of any control of the advertisements it would obviously be unwise to establish any official relationship with this class of station.

The question arises as to whether the Branches of the Association should wait to be approached by the broadcasting authorities, or whether they should make the initial move. This may be debatable, but if the medical profession were in earnest in regard to teaching the public, it would be appropriate for the Federal Committee to discuss the matter with the Broadcasting Commission as soon as it is established.

### Current Comment.

#### PROPHYLAXIS OF MEASLES WITH WHOLE BLOOD.

THE prophylaxis of measles has been discussed by S. A. Blauner and Hyman Goldstein.<sup>1</sup> They refer to three methods of active immunization. These

comprise the toxin-antitoxin method which has not gained universal acceptance. The second method is that of C. Herrmann, who suggested the transplantation of nasal mucus or discharge from a patient suffering from the disease, to the nasal mucosa of a healthy infant. For æsthetic reasons this method did not gain a footing. The third method is the giving of whole blood or serum late in the incubation period, to induce a mild form of the disorder. This method has not yet been satisfactorily established for practical use. Immunization by passive immunity is more commonly employed. Injections are made of serum from a convalescent patient or serum or whole blood of persons who have had measles at some time in the past. Conflicting reports have been made concerning Tunncliff's anti-measles diplococcus serum. Tunncliff's work has been discussed on several occasions in these pages. A. Zingher, using convalescent whole blood, plasma and serum, concluded that passive immunity can be obtained if the injections be made within five days of exposure and that the character of the disease is modified. He thought that lasting immunity resulted if serum were injected during the later periods of incubation. L. H. Barenberg's results in an epidemic of measles in 1929 were very favourable. Convalescent serum and donor's whole blood effected mitigation of the disease, with fewer complications than occurred in a control series.

Blauner and Goldstein report their experiences of an epidemic of measles in an institution with 117 susceptible children between the ages of one and six years; an attempt was made to produce immunity by injections of whole blood. At the Israel Orphan Asylum of New York, on April 19, 1930, there were 122 children within the susceptible age group. Of these five had contracted measles two or three years previously and four had an indefinite but unreliable history of measles prior to admission to the orphanage. Between April 19 and June 1, 91 children developed measles. It was determined to immunize the children as early as possible with parents' or donors' blood. The first case occurred on April 19 and the patient was removed. The next cases occurred on May 3, 7 and 9. It is stated that only three infections could have arisen from the initial source. By withholding inoculation until the second case occurred, it was attempted to obtain immunization within the five days' optimum period of exposure. Inoculation was instituted upon the occurrence of the second case. Parents' blood was desired, but the parents objected and only five inoculations were made, the amount in each instance being thirty mils of non-citrated blood. Each parent gave a past history of measles. The other children had thirty mils of citrated whole blood from two professional donors, each of whom had previously suffered from measles. On May 6, 46 children were inoculated from one donor, and on May 8, 20 from another donor. A control group of 46 children had no inoculations. Blood was given from single donors rather than pooled whole blood.

<sup>1</sup> American Journal of Diseases of Children, October, 1931.

Blauner and Goldstein point out that if one donor be non-immune, the potency of pooled blood is greatly diminished. Measles rarely develops in adults reared and living in cosmopolitan districts, and it is not likely that all the parents and the two donors belonged to the non-immune class. The results obtained in the different immunized groups were practically similar. Of those in the control group, 40% escaped measles, but only 12% of the immunized group escaped. For active immunization it is preferable to have a period of exposure of not more than five days; for passive immunization, from nine to fourteen days, assuming it possible to tell the onset of infection. In institutions not all infections are traceable to the initial source; the number of cases steadily progresses over a period of weeks. For inoculation purposes the period of exposure cannot be established and can be calculated only on the appearance of the rash, which is thirteen to fifteen days after the onset of the infection. All of the inoculated children (71) were treated within the period of exposure necessary for active or passive immunization and should have obtained benefit.

To be of value, a new remedy must confer a fair degree of protection and reduce the severity of the disease, especially regarding toxicity, duration, complications and mortality rate. Usually toxicity is directly related to the degree of pyrexia and other symptoms. The 91 sufferers from measles included five inoculated with parents' blood. Sixty-three were immunized and twenty-eight were not immunized. When there was any difference in the course of the two groups, it was only slightly in favour of the inoculated. Only 60% of the non-immunized, as contrasted with 88% of the immunized, developed measles. Possibly the antibodies of the professional donors' bloods may have been diluted by repeated bleedings; but these donors did not differ from those used by other investigators giving favourable reports. Again, the validity of this objection fails, considering the failure of parents' blood to produce better results. Cases in which inoculation was given before the onset of incubation are included in the series. Passive immunity should persist for three to four weeks, and should have been effective in such cases.

It is a moot question whether injection after incubation is the more desirable method for obtaining complete protection. In these circumstances it may be supposed that the disease is completely established, and it may be assumed that it is more difficult to overcome the infection. But if this objection be valid, a difference would be expected in the results when immunization is established within the five-day period of exposure or before or after such period. In the present series observations showed more or less uniformity throughout. Accordingly, it was considered fair to take the series of 71 cases as one group and as a proper basis for comparison with the control group. According to Blauner and Goldstein, in mass inoculations it is not possible to obtain the five-day period of exposure, because of the varying onset

of the time of incubation. Immunization occurs during a period varying from fourteen days before to nine after exposure. Most of the children in the series were within five days before or after the onset of incubation. Thirty-nine children showed immunization from one to five days after exposure, and thirty-two from one to fourteen days before exposure. In most immunization occurred within five days.

The results of these investigations are curiously at variance with other published work. It is known that some persons may have second and even third attacks of measles. Presumably their blood would not have the same amount of antibodies or produce the same immunity as the blood of others recovered from the disease. Infants seem to inherit a temporary immunity from their mothers, up till the fifth or sixth month of extrauterine life. The donors in the series reported were not convalescents, but had suffered from measles at some unspecified period in the past. But it is certain that serum from patients recently convalescent from measles is a better prophylactic and contains more antibodies than serum of adults who had measles in the remote past. For producing active immunity Nicolle suggested giving ten mils of convalescent serum, and twenty-four hours later, one mil of blood from a patient in the early stages of measles. If the injection of blood be repeated, it is claimed that immunity may be permanent. Nearly half a century ago Hugh Thompson, of Glasgow, introduced the method of blistering measles convalescents and vaccinating contacts with the serum. Good results were obtained, but the method did not gain favour. Not until the measles organism is definitely identified and isolated will prophylaxis and treatment be put on a proper basis.

#### THE SURGICAL USE OF MAGGOTS.

IN the issue of November 7, 1931, of this journal, there appeared an abstract of a paper by W. S. Baer on the treatment of chronic osteomyelitis by maggots of the blowfly. Baer sterilized the eggs of the fly by immersing them in a solution of bichloride of mercury, alcohol and dilute hydrochloric acid. In a recent communication O. R. Causey has discussed the sterilization of eggs and larvæ, and has reported some experiments.<sup>1</sup> He found that rat embryos removed aseptically by Cæsarean section and embedded in nutrient agar, constitute an adequate medium for the development of sterile blowfly larvæ. Causey was led to use rat embryos because of the failures to grow larvæ on media sterilized by steam or autoclaving. He succeeded in keeping sterile flies, produced from aseptic larvæ, in an aseptic environment for two weeks. For sterilizing the eggs he used, as Baer did, a mercuric chloride-alcohol acid compound and also had success with merthiolate.

<sup>1</sup> *The American Journal of Hygiene*, January, 1932.

## Abstracts from Current Medical Literature.

### MEDICINE.

#### Gastric Photography.

G. SPEHL (*La Presse Médicale*, April 18, 1931) describes an apparatus for photographing the interior of the stomach, invented by a Viennese engineer, M. F. Back. It consists of a semi-rigid rubber tube, like an ordinary stomach tube, with an electric lamp enclosed in metal at the end. The photographic apparatus is six centimetres long. It has sixteen small windows, through each of which a separate picture is taken, a fairly extensive area of the mucosa being thus photographed. An ordinary "Ciné" standard film is used, divided into seventy-six tiny rectangular areas. The wire conveying the electric current passes down the centre of the tube. No food is given overnight, the stomach is washed out half an hour before the photographic apparatus is used, and the stomach is emptied by suction with a syringe. Air is pumped into the stomach through the tube when it has been introduced, the patient is turned on his right or left side or on his back, according to whether the lesser curvature or the pylorus is to be photographed. The pictures are taken and the operation is completed in forty seconds. The films are developed and enlarged by a special process; usually four or five of the pictures are clear. Thirty-five pictures have been taken with this apparatus, revealing carcinomata, gastritis, oesophageal varices, ulcers, polypi and other abnormalities. This method of examination is regarded as supplementary to the clinical and radiological investigations, and is not intended to supplant them. None of the patients suffered any inconvenience from the photography.

#### Estimation of the Basal Metabolic Rate.

ANNABELLA M. GALE AND C. H. GALE (*The Lancet*, June 13, 1931) suggest a new method of estimation of the basal metabolic rate from formulæ based upon pulse rate and pulse pressure. Applying statistical methods to the data obtained from 1,006 cases collected by Dr. J. Marion Read and his assistants during the estimation of the basal metabolic rate by the portable respiration calorimeter, they suggest that Gale's formula gives the most satisfactory results. The formula is as follows. Pulse rate plus pulse pressure minus 3 equals the basal metabolic rate. This method of estimation of the basal metabolic rate is eminently suitable for use at the bedside by the general practitioner. In examining the twenty-four hour curves of the basal metabolic rates of two subjects taken at frequent intervals during three years, the authors noted that the curves tended to remain

steady between 2 p.m. and 8 p.m. Therefore, they suggest that the afternoon is the best time for estimation of the basal metabolic rate.

#### New Method of Diagnosis.

O. RECHE (*Münchener Medizinische Wochenschrift*, September 18, 1931) has been experimenting with the effect of filtered ultra-violet rays on blood sera, and considers that there are great possibilities of obtaining the accurate diagnosis of many diseases. This spectroscopic method is termed "fluorescine diagnosis". Sterile handling of the sera has eliminated any possibility of fluorescent bacteria causing the reactions, and in addition no drugs were administered during the making of the tests. He considers that for every disease there is a typical colour band and intensity of light. It is possible that further work will show that these reactions change during treatment and convalescence and thus yield valuable data. In particular the results obtained with carcinoma were very characteristic. The details of technique and the results in one hundred cases are given in full.

#### "Atophan" Poisoning.

K. EIMER (*Deutsche Medizinische Wochenschrift*, September 25, 1931) has investigated the toxicity of "Atophan" following the administration of large doses over a considerable period. His patient had taken 118 grammes within forty-one days and developed severe jaundice. This was due to degenerative changes in the liver analogous to those seen with acute yellow atrophy. The prognosis is not good and treatment consists of intravenous injections of glucose and insulin combined with magnesium sulphate irrigation of the duodenum through a sound. Prophylactic measures which should be adopted for every patient under "Atophan" treatment, include short periods of administration alternating with periods of rest from the drug.

#### Endocrine Activity of the Ovary.

EDGAR ALLEN (*The Journal of the American Medical Association*, October 24, 1931) discusses the endocrine activity of the ovary. The hormone from the ovarian follicles is the principal ovarian hormone (theelin, folliculin, oestrin); this substance produces rapid growth of vaginal epithelium and of the uterus and mammary glands, initiates secretion in the uterus, and is responsible for the development of secondary sex characters. Theelin is obtained in follicle fluid from corpora lutea, and during pregnancy from the chorionic vesicle, the placenta, the blood and the urine (in large quantities). It seems from experimental evidence that the corpus luteum may serve four or five endocrine functions in animals, but these have not been clearly demonstrated in man. Towards the end of menstruation the follicles grow rapidly under the stimulation of the

anterior lobe of the hypophysis, theelin is produced in the follicles and causes growth of the sexual organs and the mammary glands. Ovulation in women occurs about the fourteenth day following the onset of the previous menstruation, the ruptured follicle becomes transformed into the corpus luteum, which continues to elaborate follicular hormone and causes the premenstrual transformation of the endometrium and growth of the mammary glands. Any specific action of corpus luteum hormones is dependent on the growth stimulation of theelin (follicular hormone). This substance does not stimulate the development of follicles in the ovaries; consequently primary hypo-ovarian conditions should probably be treated with anterior hypophysis extract, when this is purified and biologically standardized. In amenorrhœa of long duration treatment with follicular hormone has in some instances started cyclic activity, which has occasionally persisted after cessation of treatment. Disturbances in the anterior pituitary and thyroid should be excluded before theelin is used. A declining dose of theelin is sometimes effective in treatment of pronounced menopause symptoms, either operative or natural.

#### Immunity in Virus Diseases.

W. L. AYCOCK (*The Journal of the American Medical Association*, October 24, 1931) discusses immunity in virus diseases. Since control of infectious diseases is largely based on attempts to prevent exposure to the viruses of the diseases, it is worth considering the reason for this attitude. There are two schools of thought in relation to the immunity associated with increasing age; either this immunity is due to changes in the body associated with age, or it is due to widespread infection. There is considerable evidence in favour of the second of these hypotheses. It has been recently demonstrated that a viricidal action against poliomyelitis is widespread in normal adult serum; and a similar viricidal action in normal adult serum against yellow fever has been shown in an endemic area. These two facts suggest that immunity in these diseases is due to widespread exposure. Further, experimental immunity has been produced only by the particular disease virus and has never been produced in any other way. Lastly, immunity develops only under circumstances in which association with the virus is possible, and it is absent when the presence of the virus can be definitely excluded. Thus the age distribution of measles in the Faroe Islands in 1846 showed clearly an absence of immunity in persons under sixty-five years of age, and it was known that the population had been entirely free from the disease for sixty-five years. In Nigeria a large proportion of the people are immune to yellow fever in endemic areas, although the majority of the people deny having suffered from yellow fever. Adult immunity to diphtheria is apparently due to widespread



exposure to the bacillus by means of carriers. In the diseases named above it would appear that the virus is well nigh universal in its distribution. In these circumstances some means of protection other than prevention of exposure to the virus is essential for the practical control of these diseases.

#### Respiratory Failure in Poliomyelitis.

J. L. WILSON (*The New England Journal of Medicine*, September 17, 1931) analyses respiratory failure in poliomyelitis with a view to indicating the types of patient likely to derive benefit from the employment of the Drinker respirator. In a small percentage of all patients the use of the appliance is necessary to save life, though treatment with the Drinker respirator can be carried out only with a considerable expenditure of time and money. Poliomyelitis can prevent efficient respiration in three ways: (i) Directly, by actual paralysis of the primary respiratory muscles, the intercostals and the diaphragm; (ii) directly, by disturbance of the nerve centres in the medulla or bulb which control respiration; (iii) indirectly, in patients with paralysis of the pharynx, by the collection of mucus or vomitus around the glottis. The respiratory difficulty may be due to a single one of these factors or to any combination of them. Paralysis of the respiratory muscles very frequently occurs alone without bulbar complications. Paralysis of the pharynx, the palate, or the facial muscles, all innervated from the medulla, is very frequently associated with apparent involvement of the vital centres, most evidently the respiratory. It is remarkable that such association does not always occur. The use of the Drinker respirator is most logical and has proved most effective in patients with paralysis of the intercostal muscles or diaphragm. In such patients an attempt to prolong life should be made only if there is hope that much of the paralysis seen in the acute state will be temporary. The Drinker respirator has made it possible to learn that this hope is justified. Most patients will regain, after a few weeks, sufficient muscle power to breathe unaided, provided that they can be kept alive and free from pneumonia for that period. In a patient with "bulbar" poliomyelitis without paralysis of the intercostal muscles or diaphragm it is often difficult to unravel the causes of the respiratory difficulty. Where the respiratory difficulty is apparently central in origin and is manifested by shallow, irregular respirations or by jerky, spasmodic inspiratory efforts, sometimes amounting to a succession of hiccups which do not synchronize with the rhythm of the machine, but which prevent its effective action, the patient seems little helped by the apparatus. The respirator should always be given a therapeutic trial, however, since in a few cases of "bulbar" paralysis the patients, when they do recover, are free from the paralysis found in the spinal types of the disease. Trial alone will determine

when these "bulbar" patients will be aided. It is illogical to hope to obtain aid by artificial respiration where there is pharyngeal paralysis and obstruction from unswallowed secretions. Postural drainage and aspiration of the pharynx may be necessary. Vomiting can best be avoided by rigidly refraining from giving any food by the mouth, either directly or by tube, until all fever has gone and some appetite has reappeared. Fluid can be given parenterally and by rectum for long periods. The early evidences of paralysis of the intercostal muscles or of the diaphragm may be difficult to recognize and interpret. Wakefulness, anxiety, restlessness, increase in the respiratory rate, use of the *alv nasi*, a slight respiratory grunt, disinclination to talk, or a curious, frequently interrupted, monosyllabic speech, may all precede more definite evidences of paralysis. Paralysis may extend rapidly in an hour or two. The greatest danger incident to the prolonged use of a respirator lies in difficulty of caring for the patient's general condition. In simple paralysis of the respiratory muscles, hypostatic pneumonia is the complication most to be feared. The patient's position in the machine must be regularly changed.

#### Megaduodenum and Megacolon.

THE rare coexistence of megaduodenum and megacolon is related by F. C. Arrillaga, M. Mordegia and E. Gazzotti (*Revista Medica Latino-Americana*, June, 1931). Since the literature of megacolon itself is abundant the authors chiefly confine themselves to a discussion of megaduodenum. They follow the lines set down by Duval who holds that the essential characters of this condition are that the dilatation must not be paralytic nor consecutive to a stenosis, that is, it must be a true idiopathic dilatation. It is undoubtedly of congenital origin. In the authors' case the patient was a married woman, aged forty-five years, who from the age of five years had suffered from constipation. No vomiting and no nausea were present, but for sixteen years there had been pain, at first localized to the right side of the umbilicus and making its appearance one hour after meals. Later, the site of the pain and the time of its onset changed and the patient had painful epigastric symptoms, more like true hunger pain, coming on some four or five hours after food, and especially at night time. The diagnosis can be made only by radiograph. In this instance no surgical treatment for the megaduodenum was undertaken because, with correction of the constipation, the patient's symptoms were greatly improved.

#### Treatment of Diabetes.

L. R. GROTE (*Deutsche Medizinische Wochenschrift*, December 11, 1931) has investigated the claims of a preparation called "Anticomane". This had

been widely advertised in the lay Press for the oral treatment of diabetes. It is a guanidin preparation which also contains some pancreatic extract as well as small amounts of atropine and sodium phosphate. Although no ill effects from excessive dosage are claimed by the manufacturers, Grote noted severe gastro-intestinal symptoms in 25% of his patients. He used the preparation in the treatment of a series of twenty-eight patients suffering from diabetes of varying degrees of severity. In no instance could any improvement be observed. Its action was very irregular and, as already noted, ill effects were observed. While not altogether useless, the substance is dangerous, because the advertisements claim that strict dieting may be given up shortly after the course of treatment is started.

#### Meningeal Hæmorrhage and Artificial Pneumothorax.

A CASE of meningeal hæmorrhage occurring in a patient undergoing collapse therapy for pulmonary tuberculosis is recorded by Antonio Bonadies (*Il Policlinico*, June 15, 1931). A single woman, aged twenty-one years, was knocked down by a motor car in January, 1927, and suffered from slight cerebral confusion, but resumed her work twenty-five days later. A year afterwards she developed symptoms and signs of pulmonary tuberculosis and tubercle bacilli were found in the sputum. She was treated by collapse therapy; but there was difficulty in causing collapse of the upper lobe, owing to adhesions. During the time at which positive pressure was being used to overcome these adhesions she was found in a state of partial collapse, complaining of violent headache, blurred vision, loss of strength *et cetera*. The following day she was semi-comatose, and lumbar puncture gave a blood-stained fluid under pressure of +20 to +25 with a Claude's manometer. After a period of twenty-five days in which her condition was grave, with rigidity of the neck muscles, flexion of the limbs, facial paralysis, urinary retention *et cetera*, she began to make improvement. At the time of the report she had been in excellent health for over one and a half years. The author discusses at length the diagnosis of the cerebral condition, especially the possible factor of old trauma.

#### Lipodystrophy.

A. GAREISO (*Revista Medica Latino-Americana*, May, 1931) reports a case of lipodystrophy or Barraquer's disease in a boy, aged ten years, whose parents eighteen months before had noticed in him a progressive thinning of the face. Lipodystrophy may occur in two forms, one a fixed type similar to that described by the author and so early recognizable. In the other variety the disease is less distinct and gradations occur almost to the normal.

## Hospitals.

### HOSPITAL PLANNING IN AMERICA.

MISS KATHARINE OGILVIE, Secretary of the Rachel Forster Hospital, Sydney, has recently returned from a tour in the United States of America, undertaken at the request and with the financial assistance of the Rachel Forster Hospital Committee. She has made a report to the Committee on hospital planning in America. The salient features of her report are published herewith.

The multiplication and elaboration of types of hospital service and the consequent increased demand, by all classes of people, for hospital accommodation presents a problem to hospital planners. In America it has been found that the provision of small special hospitals to serve different types of illness and different sections of the community is uneconomic, in that it leads to undue multiplication of overhead and maintenance costs.

The modern tendency in American planning is to combine general and special hospital service in units, in which accommodation is provided for all sections of the community. This policy has been supported with enthusiasm by the medical schools, which profit by the facilities offered to students owing to the centralization of large groups of patients.

Existing hospitals are being brought into closer cooperation with each other and with the university medical schools. New centres are being built, incorporating in one building plan a medical school and several hospitals served by one out-patient department and controlled from a central administrative building, with all general services centralized as far as possible.

Plans for such centres must combine accommodation for many hundreds of patients with highly developed facilities for specialization in all departments. The most striking example of this type of planning is at the Columbia Medical Centre in New York, which occupies twenty-one acres of ground and rises to twenty-two floors in height.

The medical community in American cities includes members who specialize in hospital construction, equipment and administration and practise as consultants in this sense.

Leading hospital consultants are doubtful concerning the possibility of maintaining high standards economically on this large scale. The principle of centralizing city hospital services into units of not less than 200 beds seems to be universally approved, but authorities state that a 500-bed unit is the maximum size in which ideal conditions of organization and control have been demonstrated.

Numerous hospitals for between 150 and 500 beds are maintained in the cities by the churches, the Jewish community and other public bodies; and communities in rural areas are served by similar units. These provide private, semi-private and public ward accommodation for medical, surgical and obstetric cases and children.

The positions of large new teaching community hospitals have not been chosen in relation to the needs of any particular district or section of the community. Proximity to a medical school, space for expansion, the price of land, quiet surroundings and fresh air are all determining factors in placing these hospitals outside the city area. Hospital executives claim that patients flock to the famous hospitals without regard to their accessibility.

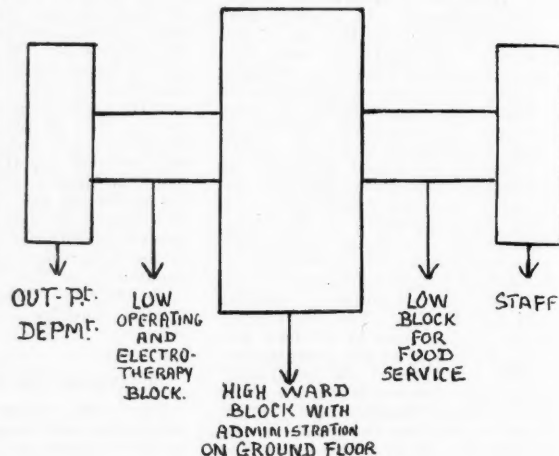
Smaller new hospitals, provided primarily for the purpose of serving the slum population, but used by all classes of patients, are placed in crowded localities. With the adoption of vertical planning and the choice of a suitable site, height is used to procure light and air; in this way the fullest use may be made of a small city site, and the main block of the building may be brought to the building line in a busy street with satisfactory results.

#### Vertical Planning.

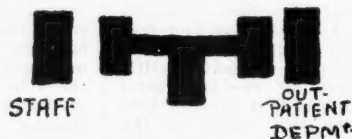
In carrying out the policy of centralized hospital services, American architects have abandoned the European system of widely spaced pavilions connected by corridors, and have adopted a vertical type of planning and construction.

Architects and consultants seem to agree that the construction of a compact building up to ten or twelve floors in height is cheaper than that of a wide spaced building of one or two floors, and that services may be maintained more economically in the vertical type of building.

The general tendency is to place ward units one above the other in blocks to a very considerable height; some new plans provide for ward blocks to a height of twenty floors. Formerly accepted rules regarding space for aeration are now disregarded and greater attention is given to the proper grouping of patients and to the interior planning and equipment of ward units. The principle of the relation of ward blocks to other services is illustrated in the accompanying diagram, which has been adopted in a number of large hospitals.



This principle forms the basis of the best modern planning and may be used in a modified form in small units. This is well exemplified in the T-shaped plan, which is used with success in numerous hospitals, accommodating from 100 to 250 patients; the head of the T is used for wards, and the base accommodates kitchen, staff dining rooms, operating services *et cetera* on successive floors. This type of plan may be used to advantage on a restricted site; a difficulty is the provision of an out-patient department and staff quarters sufficiently isolated from the hospital. A usual plan is to begin by using the ground floor for the out-patient department and some ward accommodation for the staff, with provision in the plan for placing them in separate blocks at a later date, as shown in the diagram.



Hospital consultants claim that the vertical grouping of departments requiring elaborate piping has proved to be most economical and that the substitution of well planned lift services for long passages has produced economy of effort.

The proper grouping of lifts entails accommodation for: (i) staff and public, (ii) stretcher cases, (iii) food supplies. In the large hospital centres these services are placed in separate groups; in the smaller hospitals it has been found economical to group all lifts together, with a private entrance for stretcher cases.

#### Ward Units.

*Private Patients.*—In the older hospitals and in some large new hospital centres private patients are accom-

modated in separate pavilions; in some cases these are provided with separate kitchen and operating services. This has been necessitated by the exigencies of planning on an enormous scale.

In the smaller hospitals and in some of the newest hospital centres, private and semi-private wards are brought into the central block by placing them on the upper floors. In some small hospitals these patients are accommodated on the ward floor. The extent to which this is necessary depends on the plan of the ward floor and the extent to which space is used for separation rooms for public patients. In general, it would seem that the best policy is to place private and semi-private patients in separate nursing units. The details of accommodation provide an interesting illustration of the American theory that hospital service should be of the same quality as the best hotel service; for luxury prices rooms are obtainable with thick carpets, brocade curtains, pictures, individual colour schemes, features of decoration, private bathroom and lavatory, telephone *et cetera*.

Semi-private rooms accommodate from two to four persons and are divided by curtains into cubicles. Some semi-private rooms seem to be less attractive than the public wards, owing to lack of cross ventilation; the advantage of two-bedded rooms seemed to be questionable, since neither privacy nor economy is achieved.

**Public Wards.**—Modern planning provides for ward units accommodating from 24 to 35 patients, and divided into wards and separation rooms. The space occupied by a typical unit is approximately 150 by 40 feet. In the space are single, 2-bed and 4-bed rooms for post-operative and special cases; a 12- or 16-bed ward for less serious and convalescent cases; a solarium, nurses' station, utility room, examining room, drug and dressing rooms, linen room, ward pantry, patients' bath and toilet. The nurses' station is placed so that the large ward and separation room may be seen through a glass partition. The large ward is partitioned with glass and wood into sections, so that patients' beds are in groups of four. Each bed space is provided with curtains to form a cubicle. Excellent cross-ventilation is obtained in the main ward; mechanical draught is used in some separation rooms and service rooms.

In order to effect economy in effort, service rooms are placed near the centre of the ward unit and are equipped with automatic utensil sterilizers, laundry chutes, steam drying cupboards, electric cooking and heating apparatus and refrigeration. Synthetic "white" metals are used extensively for sinks, work tables, trays, basins, bed pans, jugs *et cetera*.

Attention is being devoted to the development of a satisfactory automatic signal system for nurses to overcome the difficulty of supervising separated patients.

**Children's Wards.**—Children's wards are placed, when possible, on high floors, accessible to the roof or solarium; in the newest plans is provided an individual cubicle system which allows for the isolation of each patient by special nursing technique. Cubicles placed back to back down the centre of a ward allow wall space to be used extensively for ventilation.

**Nurseries.**—In maternity units isolated nurseries are provided for infants who may be viewed by visitors only through a glass wall.

**Isolation in Obstetric Units.**—Plans for isolation of septic patients in obstetric units vary considerably. In some newly built hospitals isolation units are situated within the main ward block, and nurses, after carrying out required precautions, use the general staff quarters; there is elaborate provision for sterilizing kitchen utensils, which are returned clean to the main kitchen.

In the new De Lee Hospital at Chicago a separate building is provided, with self-contained food and nursing service.

#### Food Service.

The adoption of vertical planning has reduced the difficulty of providing individual service to patients and staff from a central kitchen.

Hospital executives are not altogether in accord as to the extent to which this is advisable. In some modern

plants food is transported in bulk in electrically heated trucks from the central kitchen to ward pantries. These are equipped with heated serving tables and automatic dish-washers. But satisfactory and economical results are claimed for plants which eliminate the ward pantry and place the control and service of all food, including short time diets and liquids, with the chief dietician and her staff in the main kitchen.

These plants include a telephone and telautograph system from ward floors to kitchen, elaborate equipment for serving food to individual trays and for transporting trays automatically to ward floors and returning them to the central dish-washing room. It is claimed that the high cost of such equipment is fully justified by the reduction effected in labour and in wastage.

In the planning of kitchens the general policy is to preserve a "one-way" progress of food, from delivery van through sorting, refrigerating and store-room, to butchery, vegetable-room, bakery and ice cream room, to the main kitchen. Mixing machines, steam kettles and work-table are situated on one side of the central stove, with serving tables to trucks or trays on the other side.

Diet kitchens are situated adjacent to the main kitchen with use of the same store-rooms, dish-washing plant and service facilities.

Small special metabolism kitchens are attached to gastro-intestinal wards and clinics in some of the large hospitals.

#### Operating Services.

Most modern plans group the operating theatres together on one floor or in one block. Operating rooms are grouped in pairs with a scrub-up and sterilizing room dividing them and an anaesthetic room either opposite or adjacent to each room. Walls are tiled in blue or green, floors are of terrazzo laid in sections, with metal divisions "earthed" for safety. Very small window space is allowed in some modern rooms, all ventilation and lighting being artificial. Small sterilizing plants for instruments and utensils and water are provided for each pair of rooms. Sterilizing of dressings and linen is performed in a central room connected with a store-room, which, in most cases, serves the whole hospital. Instruments for the whole operating plant are stored in a central instrument room equipped with self-locking cabinets.

#### Labour and Delivery Room.

In most modern plants labour and delivery rooms are equipped with sound-proof walls and ceilings; single labour rooms are provided in proportion of from two to four to each delivery room, and are grouped together convenient to delivery rooms. Delivery rooms are grouped in pairs on the same principle as that of operating rooms already described.

#### Laboratories.

The amount of space devoted to laboratories is striking. In most large hospitals a wing or an entire floor of the central ward block is allocated for pathology, biochemistry and general research. Clinical laboratories for routine tests are provided on each ward floor, and special accommodation for students is attached to some ward units.

#### Out-Patient Departments.

The vertical type of planning has been applied to the out-patient departments, which range from one to nine floors in height. This has been necessitated by the elaboration of out-patient service into numerous special clinics. The old fashioned large central waiting halls are being superseded by smaller waiting spaces attached to each clinical unit. Admission and registration departments are planned so as to pass the patient with a minimum of delay to the appropriate clinic. Space is provided to allow each new patient to be seen in comparative privacy by a registration clerk or social service worker, and in some cases by a medical registrar, before being allotted to his clinic.

Old patients show their clinic appointment cards to the cashier, pay their fee and pass to their clinic. Provision



is made for automatic transmission of the patient's identification data to the records room, when his record is sent direct to his clinic. In many modern out-patient departments clinics are operated on an appointments system, and records of old patients having appointments are pulled daily before clinic hours and despatched to appropriate clinics. Appointment clerks are accommodated in each clinic or in the central registration room. Waiting space allocated to clinics is provided in corridors with clinical units on either side, or between the main corridor and the outside wall, at the intake end of the clinic. The former plan presents difficulties of lighting and ventilation, and the latter is becoming more usual; although it is extravagant in use of outside wall space, it provides comfortable conditions for waiting patients and allows for quiet and efficient sorting by nursing and social service staffs. A control desk or office for the charge nurse, room for the social worker and a room for preliminary tests are provided adjacent to the waiting space in each clinic; these are connected by a service corridor with the medical officers' rooms.

Modern teaching hospitals appoint a numerous visiting medical staff and enforce regulations limiting the daily attendance of out-patients, so that the number of patients seen by each medical practitioner is between eight and fifteen per clinic session; each medical officer is accommodated in a combined consulting and examining room, except in surgical treatment clinics, where dressing and treatment cubicles are provided.

Elaborately equipped X ray and therapy departments are planned so as to be accessible to in-patients and out-patients.

#### Social Service.

Accommodation for social service workers is regarded as essential. The central office for referred patients and in-patients is situated in the administrative wing, and offices are provided in the admission department and individual out-patient clinics according to the policy of the hospital.

#### Records.

Most modern plans provide for one central records room adjacent to the out-patients' department. In-patients' and out-patients' records are filed together in steel cabinets which hold a perpetual file of numbered records. A separate cross file for registration of patient's name and identification data is placed near to the main records file and a section of the room is used for a diagnostic file.

For the records file, medical nursing, laboratory, X ray and social service notes of each patient are collected and placed in folders. The policy of making all records perpetually accessible necessitates the use of a very large space. Pneumatic tubes and various types of patent carriers are used with success to transport the records to and from clinics and wards.

#### Costs.

The cost of construction and maintenance of the elaborate modern community hospital seems to be enormous in comparison with that of the old fashioned type of public hospital. Considerable efforts are being made to reduce the operation of semi-private sections to a cost price basis and to allocate a margin from private patients' sections and general services (for example, X ray) to be used towards defraying the difference between the cost of maintaining public wards and patients' contributions.

Separation of ward patients into small groups has necessitated a considerable increase in trained nursing staff and some increase in untrained staff. The provision of improved mechanical devices has reduced the routine duties of the student nurse; but time saved in this respect has been allocated to some extent for increased theoretical study and specialization.

Hospital authorities seem to be unanimous in the opinion that increased costs are fully justified by results. It is claimed that the excellent conditions offered to the patient in the modern hospital have been an important

factor in reducing the average duration of the patient's occupancy of the hospital bed.

At the same time it is evident that the mounting costs of curative services are a source of anxiety to hospital authorities and to the philanthropic public, especially in view of the present uncertainty of the financial outlook.

#### Hospitals as Health Centres.

The economic aspect of the health problem is a factor in directing public attention to the necessity for prevention and early treatment of disease. Life insurance companies, business houses, voluntary social agencies and public health authorities are conducting campaigns for the promotion of health education and periodic examinations for children and adults. In the medical schools and colleges increased attention is being devoted to training students in the theory and practice of preventive medicine.

Considerable progress is being effected in the organization of district health centres, in which are combined public and voluntary medical, nursing and social services on a district basis.

Hospitals are cooperating through their social service departments with these services and are developing supplementary health clinics and facilities for health education within their own walls. Modern plans provide for auditoria for public lectures, class rooms attached to prenatal clinics, well-baby and pre-school clinics, diet demonstration classrooms and clinics for the periodic examination of the apparently healthy.

It seems evident that increasing public interest in the prevention of disease will lead to further development of health services as an essential function of the future hospital.

### Obituary.

#### ROBERT HENRY TODD.

THROUGH an unfortunate oversight, for which we wish to express regret, the contribution of Dr. T. W. Lipscomb, Chairman of Directors of the Australasian Medical Publishing Company, Limited, to the obituary notice to the late Robert Henry Todd was omitted from the issue of March 12, 1932. Dr. Lipscomb was present as Chairman of Directors of the Company at the Dedication Ceremony at the British Medical Association House, 135, Macquarie Street, Sydney, on February 20, 1932.

Dr. Lipscomb wrote as follows:

It is with a feeling of gratitude that I take this opportunity of expressing in a meagre way my tribute to Robert Henry Todd. Our association began early in the century, when I became an office-bearer of the Western Suburbs Medical Association, this being one of the local associations of medical practitioners into which New South Wales was divided; the formation of later ones and the development of them all were largely, if not wholly, due to Todd. The object of these associations was to hold local clinical meetings and to discuss matters of local interest. The formation and encouragement of such local associations were part of Todd's scheme for the organization of the profession in this State, making each and every practitioner feel that he had a live and personal interest in the New South Wales Branch of the British Medical Association. If ever a matter came before the Branch Council concerning a particular locality, Todd always upheld the principle: "See what the Local Association has to say about it first"; and that principle has been followed by the Branch Council ever since.

In furtherance of this object, it was he who inaugurated the holding of an annual meeting of delegates of Local Associations with the Branch Council. This meeting has proved most valuable to the Council in the discussion of various matters concerning all branches of medical practice, particularly in the more remote country areas. This was only one of Todd's dreams for making the New South

Wales Branch the actual representative of the medical profession in that State.

Another was the accessibility of the Honorary Secretary of the Branch to all and sundry, doctors and laymen, who wanted information and advice. No one had a wider knowledge than he of all matters connected with medical practice, ethics and the customs and proper usages of the profession in this and other parts of the world.

As a confirmation of his principle of always asking for the opinion of those actually concerned, the well known example of the inauguration of the "Common Form of Agreement between Medical Officer and Friendly Society Lodge" can be cited. Todd always and correctly maintained that the Council of the Branch could not act unless it was requested to do so by the lodge medical officers. It is now a matter of history that the majority of lodge medical officers did so request and unreservedly sent their resignations of their individual appointments held to the Council to enable new agreements to be drawn up between lodge medical officers and the trustees of individual friendly society lodges. This approved "Common Form of Agreement" is the agreement still in force, and has been so since its inauguration in 1914, with an increase in rates for attendance in ratio with an increase of the wage limit arranged harmoniously with the Friendly Societies' Association in 1921. We in New South Wales consider this the best contract medical service in the world, giving a high-class medical service at a reasonable rate to that section of the community who from their financial circumstances are eligible to be in friendly societies for medical benefits. The "Common Form of Agreement" has worked most smoothly, the machinery for issuing and recording the agreements at a minimum of expense being due to Todd. The present happy relations existing between the Grand Lodge officials of the friendly societies and the individual medical officers and the Council of the Branch are largely due to Todd's influence; for he was a friend to all these Grand Lodge officials, and between them they solved many minor difficulties.

Of Todd's work as Secretary of the Australasian Medical Publishing Company, Limited, I can only speak in unqualified praise. The Company was only one of Todd's many medical babies; it was at his request that I joined the Board some years ago and helped him to nurse the baby through a somewhat troublesome teething stage and place it on what now seem to be sturdy adolescent legs. It has been my privilege to see a great deal of him during this association, to envy his logical way of looking at facts, to love him as a man, and to admire his wonderful, idealistic outlook and purpose: that nothing but the best was good enough, and that that best was not for the individual practitioner, but for the public benefit. His dictum ever was: "What is best for the public is best for the profession."

In his own home he was thoroughly charming and with an easy manner, for his wide knowledge of many things and many lands, of zoological gardens and their inhabitants, his inborn love of music and the arts, made him a good conversationalist. His name will be ever honoured in this State, not only by medicine, but by all branches of human activities that tend to the betterment of mankind.

#### ERNEST HAROLD BRITTEN.

DR. ERNEST HAROLD BRITTEN, who died at Elsternwick, Victoria, on January 19, 1932, at the age of thirty-eight years, was the son of the Reverend A. E. and Mrs. Britten, of Footscray, Victoria. His school days were spent at Geelong Grammar School, where he held a resident scholarship. He became a school prefect and was a keen athlete; he won several cups for swimming. He studied medicine at the University of Melbourne and graduated as Bachelor of Medicine and Bachelor of Surgery in 1917. He enlisted for active service with the Australian Imperial Force in 1915, but was asked to complete his medical course. After graduation he worked for a while at a base hospital in Melbourne, and in 1918 was sent overseas. He was attached to the Eighth Field Ambulance and remained in France

till after the signing of the armistice. Before returning to Australia he held a resident post at the Bath Hospital, England. After returning to Australia he took up practice at Cheltenham, Victoria. Eventually he had to retire on account of ill-health, and he lived at Elsternwick until the time of his death. He leaves a wife and two young sons.

## Post-Graduate Work.

### ANNUAL POST-GRADUATE COURSE IN BRISBANE.

THE annual post-graduate course will be held in Brisbane from May 23 to May 27, 1932.

Dr. J. G. Edwards, of Sydney, Dr. C. W. B. Littlejohn and Dr. J. F. Mackeddie, of Melbourne, will deliver lecture-demonstrations on various subjects. Professor W. A. Osborne, of Melbourne, will, on Friday, May 27, deliver the Joseph Bancroft Memorial Lecture. The title of his oration will be "The Price of Progress".

Members are asked to notify the Honorary Secretary, Dr. L. W. N. Gibson, British Medical Association Buildings, 35, Adelaide Street, Brisbane, whether they intend to be present and whether or not they will be accompanied by their wives.

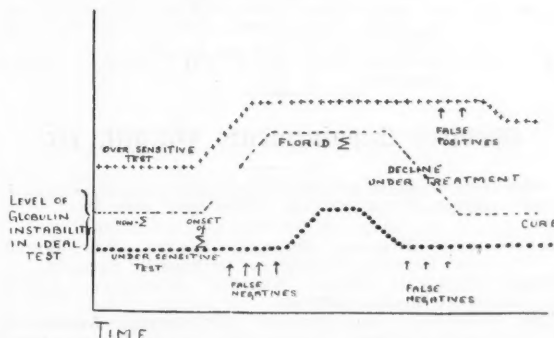
## Correspondence.

### THE WASSERMANN AND KLINE TESTS.

SIR: "Practitioner" comments in THE MEDICAL JOURNAL OF AUSTRALIA of February 6 on the Wassermann and Kline results published by Mesdames Ashworth and Irving. He would particularly like to know "why it is an advantage to test by more than one method".

I have been privileged to see a proof of the reply offered by the two workers whose report is referred to, and I agree with it entirely, but would like to offer something from the practitioner's viewpoint.

First of all "Practitioner" must remind himself that no serological test for syphilis will detect it 100 times in 100 different cases, and it is surprising how many place implicit reliance upon the laboratory report. They carry their faith even to the point of denying the serologist any right to interpret his result or even to "bias" him, as they would say, with an effective history of the case. This faith is quite unjustifiable; in fact, at the last competitive meeting, held at Montevideo under the auspices of the League of Nations, twelve different methods (averaged) did not succeed in revealing more than 59% of positive reactions in 623 known cases of syphilis.



It is generally accepted as probable today that all serological tests for syphilis, whether complement fixation (that is, Wassermann-Bordet), Kahn, Klein, Vernes, Meinicke, Müller *et cetera*, all depend upon an increased

instability of serum globulins, that is, a colloid phenomenon. But globulin, even in normal serum, is unstable, though to a less degree than in syphilitic sera.

The serologist's task consists in devising a test that will just fail to disturb the colloid equilibrium of normal serum, but will immediately do so in the presence of syphilis. In practice it will be found that no such ideal can be attained; a very sensitive test will reveal a very high percentage of cases, but at the same time will give false positives where no disease exists. Similarly, a relatively insensitive test will fail to react where it should.

A diagram can be constructed to illustrate this.

Minute variations in technique, in gathering of blood, storage *et cetera*, may be quite easily the cause of further discrepancies.

Two tests of an unknown serum, especially if they are known to be of different sensitivity, when in agreement with each other, that is, both negative or both positive, must add certainty to the diagnosis. If they disagree, they do nothing but affirm the necessity of repeating the tests then or later.

Epigrammatically put, a blood test in syphilis is a physical sign of fair reliability which the practitioner must carry to the bedside and there add to the other signs clinically observable, and a test by two different methods would represent two different views of the same physical sign.

Yours, etc.,

HENRY SHANNON.

Malvern,  
Victoria,  
February 10, 1932.

### Books Received.

THE SCIENCE OF SIGNS AND SYMPTOMS IN RELATION TO MODERN DIAGNOSIS AND TREATMENT: A TEXT-BOOK FOR GENERAL PRACTITIONERS OF MEDICINE, by R. J. Stewart McDowall, D.Sc., M.B., F.R.C.P.; 1931. London: William Heinemann (Medical Books) Limited. Royal 8vo., pp. 448. Price: 21s. net.

THE GENESIS OF CANCER, by W. S. Handley, M.S., F.R.C.S.; 1931. London: Kegan Paul, Trench, Trubner and Company, Limited; Australia: Angus and Robertson Ltd. Demy 8vo., pp. 274, with illustrations.

### Diary for the Month.

- MAR. 29.—New South Wales Branch, B.M.A.: Council (Quarterly).  
MAR. 31.—South Australian Branch, B.M.A.: Branch.  
MAR. 31.—New South Wales Branch, B.M.A.: Annual Meeting.  
APR. 1.—Queensland Branch, B.M.A.: Branch.  
APR. 5.—New South Wales Branch, B.M.A.: Council (Election of Officers and Standing Committees).  
APR. 6.—Victorian Branch, B.M.A.: Branch.  
APR. 7.—South Australian Branch, B.M.A.: Council.  
APR. 8.—Queensland Branch, B.M.A.: Council.  
APR. 12.—New South Wales Branch, B.M.A.: Ethics Committee.  
APR. 14.—New South Wales Branch, B.M.A.: Clinical Meeting.  
APR. 19.—New South Wales Branch B.M.A.: Executive and Finance Committee.  
APR. 22.—Queensland Branch, B.M.A.: Council.  
APR. 26.—New South Wales Branch, B.M.A.: Medical Politics Committee.

### Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xvi.

MARRICKVILLE DISTRICT HOSPITAL, SYDNEY, NEW SOUTH WALES: Honorary Consultant Orthopedic Surgeon.

PERTH HOSPITAL, PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officers.

THE PRODUCERS AND CITIZENS' CO-OPERATIVE ASSURANCE COMPANY, LIMITED, SYDNEY, NEW SOUTH WALES: Principal Medical Officer.

THE WOMEN'S HOSPITAL, SYDNEY, NEW SOUTH WALES: Junior Resident Medical Officer.

VICTORIAN EYE AND EAR HOSPITAL, MELBOURNE, VICTORIA: Resident Surgeons (3).

### Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associated Friendly Societies' Medical Institute. Mount Isa Mines. Toowoomba Associated Friendly Societies' Medical Institute. Chillagoe Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 65, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

### Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Sermer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

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